

中压开关装置
Medium-Voltage
Switchgear

8BK20型
装有可移开式断路器的开关装置
额定电压 7.2~12kV

8BK20
With Withdrawable Circuit-Breakers
Switchgear up to 12kV

SIEMENS

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Type 8BK20 Switchgear up to 12kV With Withdrawable Circuit-Breakers

空气绝缘，金属封闭，
金属铠装，单/双母线
Air-Insulated, Metal-Enclosed, Metal-Clad, Single/Duplicate Busbar

应用说明 Application

典型用途 Typical uses

8BK20 型装有可移开式断路器的开关装置　8BK20 switchgear with withdrawable circuit-breakers

户内用 8BK20 型可移开式断路器开关装置适用于：

- 额定电压从 7.2kV 至12kV
- 额定短路开断电流最大至50kA
- 馈线及母线额定电流至4000A

8BK20 switchgear for indoor installation with withdrawable circuit-breaker is suitable for:

- Rated voltages from 7.2 kV to 12kV
- Rated short circuit breaking currents up to 50kA
- Feeder and busbar rated currents up to 4000 A

8BK20 型开关装置应用在下列典型场所：

- 发电厂、变电站以及供电系统的配电所
- 水泥工业
- 汽车工业
- 钢铁厂
- 轧钢厂
- 矿山
- 食品及化纤工业
- 化工
- 石油工业
- 管道工程
- 海湾石油装置
- 电化学工业
- 石油化工
- 铁路系统的供电
- 造船工业
- 柴油发电机电站
- 应急发电装置

8BK20 switchgear is used in the following typical areas:

- Power stations ,transformer stations and switching substations of public utilities
- Cement industry
- Automotive industry
- Iron and steel works
- Rolling mills
- Mines
- Food and fibre industry
- Chemical industry
- Oil industry
- Pipelines
- Offshore installations
- Electrochemicals
- Petrochemicals
- Railway power supplies
- Ship building
- Diesel power stations
- Emergency power supplies



特征介绍 Features

人身安全

门关闭后才可操作断路器

由于下述原因，更加确保了人身安全

- 断路器的分、合操作：
  - 在断开位置或工作位置上
  - 手动或电动
  - 门总是关闭着的
- 在门关闭时，用手动或电动机驱动可移开部分，将之与母线隔离
- 根据 VDE0105 第一部分，有二种方法可供选择，检验是否带电：
  - 门关闭时，用容性电压带电显示器检测相间电压（参阅第29页）
  - 用通常的符合VDE0681, 第4部分的电压测试器测量相间电压，但门须打开。
- 门关闭时，合分接地开关：
  - 馈电柜：手动或电动机驱动
  - 母排：手动

门及可移开部分的联锁

- 只有当可移开部分锁在断开位置上时，门才能打开。
- 只有在门关闭以后，可移开部分才能从断开位置移动到工作位置

防止触电以及阻止外部物体进入

8BK20开关装置提供了内部及外部的双重保护

- 外部保护由下述方法提供：
  - 在各种运行状态下，开关柜完全封闭
- 内部保护由下述方法提供：
  - 内部各室均用金属板隔开并使用加强型的活门。
  - 由小室隔开，任选抗电弧的方式防护等级

标准方式 IP4X/IP40

更高程度的防护如 IP41 IP50及IP51可以用增加措施的办法来获得

经过抗弧试验的钢板箱体和隔室

8BK20开关装置已根据相关标准作过抗弧试验以保证：

- 外部保护（人身安全）

操作方法

移动柜内的可移开部分

采用下述辅助措施，可用手或电动机很轻便地驱动柜内的可移开部分：

- 丝杠
- 装有滚动轴承的导轨

在开关柜外搬运可移开部分

在开关柜外，也可很容易、轻松地搬运可移开部分

- 使用维护小车（见第6页）
- 只需1人
- 无需其它工具
- 对地面的平整度无要求

搬运可移开部分的操作程序

- 将可移开部分退至断开位置
- 打开柜门
- 拔下低压插头
- 解除可移开部分的联锁（如果不慎移动可移开部分，则被一个附加的联锁装置所阻止）
- 摇高搬运小车，并将之扣在开关柜上（前述的附加联锁自动解锁）
- 将可移开部分推到小车上，并尽量使之靠近车身支架。（不能使它落下来）
- 将维护小车和可移开部分从开关柜上分离开。

遥 控

在中央控制室，可进行下述遥控操作：

- 将有电动机推进装置的可移开部分送入工作位置或退至断开位置。
- 分、合断路器
- 电动机操作接地开关将馈电柜接地、短路。

同时仍永远能进行柜前控制操作

设备的可靠性

开关装置的联锁

所有联锁装置都是机械式的，这种用钥匙控制的联锁可防止误操作，即：

- 曲柄只有在各项联锁条件满足时才能插入孔内
- 这样可以避免用力过猛损伤联锁机构。

电气强度

8BK20开关装置足够的电气强度是由下述措施确保的：

- 相与相以及相对地之间有足够的空气间隙。
- 合理的电极形状

这种设计特点允许所有的母排无需再使用其它的绝缘材料。

最大限度地不受气候及周围环境的影响

这是由于下述原因

- 有大爬距裙边的绝缘子及树脂浇注绝缘套管，对污染具有很强的抵抗力。
- 在所有操作中、整个装置都处于封闭状态；

维 护

最少的维护工作量是由下述原因取得保证的：

- 所有操作都是在开关装置处于全封闭状态下进行的；
- 应用考核过的真空开关设备和无需维护的断路器以及很少维护的操作机构。

通用性

在扩充开关装置或维修时，可方便地采用下列部件：

- 标准绝缘子
- 标准互感器
- 标准真空开关装置
- 标准铜构件

特征介绍 Features

Personnel safety

Switching operations with door closed

Personnel safety increased by:

- Opening and closing of the switching device:
  - In the disconnected or connected position
  - Mechanically or electrically
  - With the door closed.
- Isolation by moving the withdrawable section, manually or motorized, with the door closed.
  Verification of safe isolation from supply.According to DIN VDE 0105.
- Part 1,there are two alternative methods:
  - Pole-by-pole testing with a capacitive voltage detector(see also page 29 with the door closed)
  - Testing with conventional voltage testers to DIN VDE 0681, Part 4, but with the door open
- Opening and closing of the earthing switch, optionally make-proof, with the door closed:
  - Feeder:manual or motorized
  - Busbar:manual.

Interlocking of door/withdrawable section

The door is incorporated in the interlocking concepts as follows:

- Opening is possible only when the withdrawable section is locked in the disconnected position.
- The withdrawable section can be moved from the disconnected to the service position only when the door is closed.

Protection against electric shock and ingress of foreign bodies

8BK20 switchgear provides both external and internal protection.

- External protection is provided by:
  - Complete enclosure of the panels in all operating states.
- Internal protection is provided by:
  - Internal metal compartmentalization with enforced-operation shutters.
  - The inter-cubicle partitions: optional arc-resistant version.
- Degree of protection
  Standard version IP4X/IP40
  Higher degrees of protection, such as IP 41,IP50 and IP 51 can be obtained by additional measures.

Arc-tested sheet-steel enclosure or compartmentalization

8BK20 switchgear has been tested according to the relevant standards for resistance to accidental arcing to ensure:

- External protection (personnel safety)

Operation

Moving a withdrawable section inside a panel

Little effort is required by hand or motor to move a withdrawable section inside a panel with the aid of:

- A spindle mechanism
- Ball-bearing rollers.

Moving a withdrawable section outside a panel

A withdrawable section is light and easy to move outside a panel:

- With a central service truck(see also page 6)
- By one person
- Without tools
- Regardless of floor surface.

Sequence for removing the withdrawable section

- Move the withdrawable section into the disconnected position
- Open the door
- Unplug the low voltage connector
- Unlock the withdrawalbe section (unintentional removal of the withdrawable section is prevented by an additional interlock)
- Bring up the central service truck and lock it onto the panel (additional interlock is then overridden)
- Pull out the withdrawable section onto the truck as far as it will go (it cannot fall)
- Detach the central service truck and withdrawable section from the panel.

Remote control

Electric remote control.e.g. from a central control room,can be provided for the following functions:

- Moving a motorized withdrawable section into the disconnected or connected position
- Opening and closing of the switching device
- Feeder earthing and short-circuiting with motor-operated earthing switch
  There is also always local manual operation for all functions.

Equipment reliability

Switchgear interlocking

All interlocks are mechanical with preventive,key-operated access shutters,i.e.

- Operating lever can only be inserted when the interlocking conditions are fulfilled
- This prevents overstraining of the interlocking mechanisms.

Electric strength

Adequate electric strength of 8BK20 switchgear is assured by:

- Sufficiently large air gaps between phases and to earth
- Suitable electrode form.

These design features allow all conductor insulation to be dispensed with entirely.

Highest level of independence of climate and environment

This is provided by:

- Ribbed insulators and bushings in cast resin,with high resistance to pollution
- Total enclosure under all operation conditions.

Maintenance

Minimal maintenance effort is assured by:

- Total enclosure under all operating conditions
- use of proven,maintenance free vacuum switching devices

Availability

Easy procurement or parts for extensions and repairs through the use of:

- Standard insulators
- Standard instrument transformers
- Standard vacuum switching devices
- Standard copper sections.

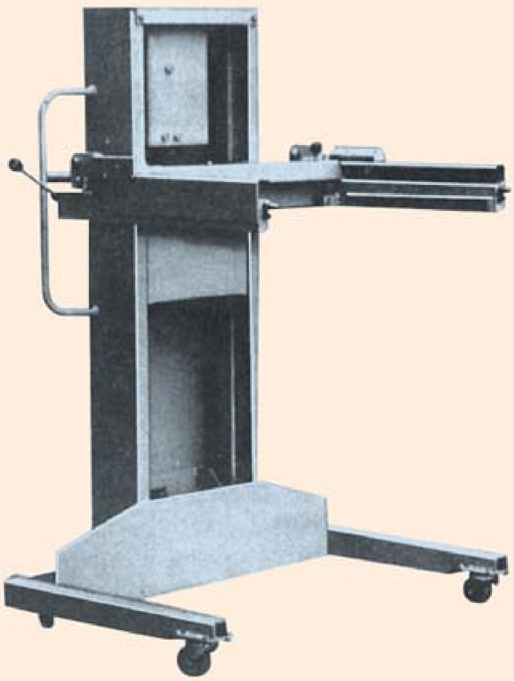
特征介绍 Features

维护小车

- 可移开部分能够降低到地面
- 不能折叠
- 可移开部分能够自动锁到小车上
- 提升臂可以摇到的最大高度为 1200 mm
- 直径大而且可导向的轮子
- 适合于所有的可移开部分

Central service truck

- Withdrawable section can be lowered to the floor
- Non-collapsible
- Withdrawable section locks automatically onto the truck
- Lifting arms can be cranked up to various maximum heights 1200mm.
- Large,swivelling wheels
- Suitable for all withdrawable sections.



待用状态 Ready to use
维护小车 Central service truck

电气数据

可移开式真空断路器柜
隔离排连接柜
母线分段柜
铜排连接柜， I 型
铜排连接柜， II 型
电缆连接柜

Electrical data

Withdrawable vacuum circuit-breaker panel
Disconnector-link panel
Sectionalizer panel
Busbar connection panel, type I
Busbar connection panel, type II
Cable connection panel

名称 Designation		额定电压，绝缘等级 Rated voltage, insulation	
		7.2kV List 2	12kV List 2
宽度 Width	mm	800	800
额定工频耐受电压 Rated power-frequency withstand voltage	最大 max.kV	20,32*	28,42*
额定雷电冲击耐受电压 Rated lightning impulse withstand voltage	最大 max.kV	60	75
额定短路开断电流 Rated short-circuit breaking current	最大 max.kA	50	50
额定热稳定电流 Rated short-time current, 3s**	最大 max.kA	50	50
额定短路关合电流/额定峰值电流 Rated short-circuit making current/rated peak current	最大 max.kA	125	125
额定母线电流 Rated current of busbars	最大 max.A	4000	4000
开关柜额定电流 Rated current feeders	最大 max.A	4000	4000

注：*用于中国电力系统，** 25－40kA 达 4s.
Note:* For Chinese Power System, ** 4s for 25-40kA

技术数据 Technical Data

电气数据 Electrical data

可移开式真空接触器柜
Withdrawable vacuum contactor panel

名称 Designation		额定电压，绝缘等级 Rated voltage,insulation	
		7.2kV List 2	12kV List 2
宽度 Width	mm	800	800
额定工频耐受电压 Rated power-frequency withstand voltage	最大 mas.kV	20,32*	42
额定雷电冲击耐受电压 Rated lightning impulse withstand voltage	最大 mas.kV	60	75
额定热稳定电流 Rated short-time current	最大 1s max.kA	50[2)]	50[2)]
	最大 4s max.kA	40[2)]	40[2)]
额定短路关合电流/ 额定峰值电流 Rated short-circuit making current/rated peak current	最大 max.kA	100	100
额定母线电流 Rated current of busbars	最大 max.A	4000	4000
馈电柜额定电流 Rated current of feeders	最大 max.A	400	400
高压限流熔断器长度 Dimension HVHRC fuses	mm	292	292

测量柜
Metering panel

名称 Designation		额定电压，绝缘等级 Rated voltage,insulation	
		7.2kV List 2	12kV List 2
宽度 Width	mm	800	800
额定工频耐受电压 Rated power-frequency withstand voltage	最大 max.kV	20,32*	28,42*
额定雷电冲击耐受电压 Rated lightning impulse withstand voltage	最大 max.kV	60	75
额定热稳定电流 Rated short-time current **	最大 3s max.kA	50	50
额定峰值电流 Rated peak current	最大 max.kA	125	125
额定母线电流 Rated current of busbars	最大 max.A	4000	4000

注：*用于中国电力系统，** 25-40kA 达 4s.

Note:* For Chinese Power System, **4s for 25-40kA

电气数据、尺寸
接地变压器柜
Electrical data, dimensions
Earthing transformer panel

名称 Designation		额定电压，绝缘等级 Rated voltage, insulation	
		7.2kV List 2	12kV List 2
宽度 Width	mm	800	800
额定工频耐受电压 Rated power-frequency withstand voltage	最大 max.kV	32	42
额定雷电冲击耐受电压 Rated lightning impulse withstand voltage	最大 max.kV	60	75
额定热稳定电流 Rated short-time current * *	最大 3s max.kA	50	50
额定短路关合电流/额定峰值电流 Rated short-circuit making current/rated peak current	最大 max.kA	125	125
额定母线电流 Rated current of busbars	最大 max.A	4000	4000

柜体尺寸
Panel dimensions

名称 Designation		额定电压，绝缘等级 Rated voltage,insulation	
		7.2kV List 2	12kV List 2
宽度 Width	mm	800	800
高度 Height	mm	2050	2050
电缆直接连到母排时的高度 Height with cable connection to the busbars	mm	2550	2550
带符合 PEHLA 标准 1-6，历时1秒钟故障电弧有倾斜板时的高度	20kA mm	2050	2050
Height with deflecting plate fitted to comply with PEHLA criteria 1-6, for 1s fault arc duration:	≥ 25kA mm	2450	2450
单母线柜深度 Depth of single busbar panel 从前面接线，靠墙安装 Connection at front, wall mounting[1]	mm	1650	1650
从前面接线，靠墙安装或单独竖立 Connection at front, wall mounting or free standing[1]	mm	1775	1775
从后面接线，单独竖立 Connection at rear,free standing[1]	mm	1775	1775
双母线柜，背靠背布置 Duplicate busbar panel in back-to-back arrangement	mm	3560[2]	3560[2]

1) 参阅第 30 页开关柜的接线方式说明
2) 对额定短路开断电流为 50kA 的深度为: 3960mm
1) See also under Panel connection, page 30
2) Depth 3960mm for rated short-circuit breaking current 50kA

技术数据 Technical Data

尺寸

低压室内部可利用的空间尺寸

Usable internal dimensions of the low-voltage compartment

低压室型式 Version of low-voltage compartment			额定电压，绝缘等级 Rated voltage,insulation	
			7.2kV List 2	12kV List 2
宽度 Width		mm	800	800
标准型 Standard compartment	宽 Width	mm	680	680
	高 Height	mm	680	680
	深 Depth	mm	450	450
附加顶箱 Additional top box	宽 Width	mm	680	680
	高 Height	mm	400	400
	深 Depth	mm	420	420

高压电缆室内部可利用的高度

从电缆夹持架至底板开孔中心之间的距离

Usable internal height for high-voltage cables

Distance between centres of lug hole and cable clamp support rail

内部高度 Internal height		额定电压，绝缘等级 Rated voltage,insulation	
		7.2kV	12kV
宽度 Width	mm	800	800
标准型 Standard version 从前面接线 connection at front	约 approx. mm	425	425
从后面接线 connection at rear	约 approx. mm	600	600
有较深底板的标准型 Standard version with deeper bottom plate 从前面接线 Connection at front	约 approx. mm	625	625
从后面接线 Connection at rear	约 approx. mm	800	800

安装说明

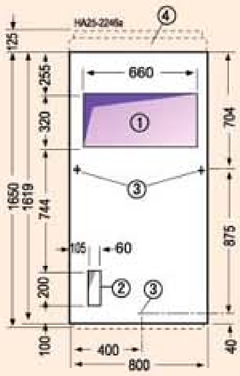
从前面接线7.2/12kV地板开槽及固定点

- 适用于单母线
- 适用于双母线面对面布置

Installation details

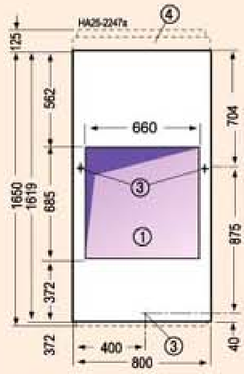
7.2/12kV,connection at front
Floor cutouts and fixing points

- For single busbars
- For duplicate busbars in face-to-face arrangement



图A
- 对有可移开部分的开关柜，可不选用④
- 对铜排连接的Ⅰ，Ⅱ型柜，当其每相最大为 4 根 500mm²电缆时，也可不用④
- 对于分段柜，为2X图A，但无①，也可不选用④
- 对于测量柜，无①，也可不选用④

Fig. A
for withdrawable panel, optionally without ④
for busbar connection panel,
type Ⅰ and type Ⅱ up to 4 × 500mm² sealing ends²) per phase,
optionally without④
for sectionalizer, 2 × Fig.A
but without①
optionally without④
for metering panel,
but without①
optionally without④



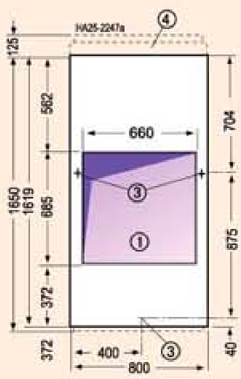
图B
- 用于铜排连接的Ⅱ型柜，每相电缆，从5根500mm²至12根500mm²，也可不选用④

Fig.B
for busbar connection panel,
type Ⅱ,with5×500mm²
up to 12×500mm²
sealing ends¹) per phase,
optionally without④

7.2 /12kV 开关设备，从前面接线时地板开槽及固定点位置
Floor cutouts and fixing points for 7.2/12kV switchgear, connection at front

① 用于电缆接线的地板开槽(按用户要求，也可以用铜排连接)
② 控制电缆用地板开槽
③ 固定点(25×45mm槽)与柜体前面平行
④ 装在背面的电缆室压力释放通道(额定短路开断电流50kA的开关柜是必需的)
1) 参阅西门子通常采用的交联聚乙烯单芯密封电缆头或类似尺寸的其它产品。

① Floor cutout for high-voltage cables (bus connections on request)
② Floor cutout for control cables
③ Fixing point (25 x 45mm slot) parallel to panel front
④ Rear-mounted pressure relief duct of connection compartment (always necessary for rated short-circuit breaking current 50kA)
1) The data refer to Siemens conventional single-core sealing ends for XLPE cables for other makes with similar dimensions.



图C
用于电缆连接柜可不选用④

Fig.C
for cable connection panel,
optionally without④

7.2 /12kV 开关设备，从前面接线时地板开槽及固定点位置
Floor cutouts and fixing points for 7.2/12kV switchgear, connection at front

技术数据 Technical Data

安装说明

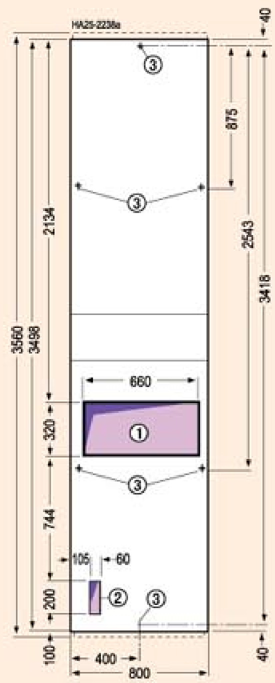
从前面接线7.2/12kV地板开槽及固定点

- 用于双母线背靠背布置

Installation details

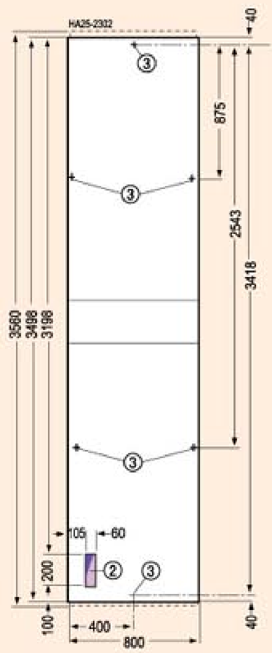
7.2/12kV,connection at front
Floor cutouts and fixing points

- For duplicate busbars in back-to-back arrangement



图D
用于分段柜，测量柜及用铜排连接的开关柜应采用图A
电缆接线的开关柜应采用图C

Fig.D
for sectionalizer,
metering and busbar connection panels Fig.A should be used
for cable connection panels Fig.C



图E
用于母线耦合柜

Fig.E
for bus coupler

从前面接线的7.2 /12kV 开关装置地板开槽及固定点位置

Floor cutouts and fixing points for 7.2/12kV switchgear, connection at front

从后面接线[1]的 7.2/12kV 开关装置地板开槽及固定点

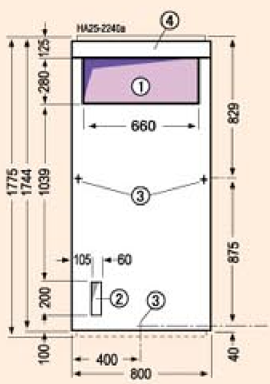
- 用于单母线
- 用于双母线面对面布置

①高压电缆连接时的地板开槽(根据用户要求，也可用铜排连接)
②控制电缆用地板开槽
③固定点 (25×45mm 槽) 与柜体前面平行
④安装在背后的电缆室释压通道
1) 额定短路开断电流为50kA时，应按用户需要

7.2/12kV,connection at rear[1])
Floor cutouts and fixing points

- For single busbars
- For duplicate busbars in face-to-face arrangement

① Floor cutout for high-voltage cables (bus connections on request)
② Floor cutout for control cables
③ Fixing point (25 x 45mm slot) parallel to panel front
④ Rear-mounted pessure relief duct of connection compartment
1) For rated short-circuit breaking current 50kA on request.



图F
用于可移开式开关柜有④
用于分段柜2X1图F，但无①
用于测量柜，但无①

Fig.F
for withdrawable panel with ④
for sectionalizer, 2X Fig.F
but without ①
for metering panel,but without ①

7.2 /12kV 开关设备，从后面接线时地板开槽及固定点位置

Floor cutouts and fixing points for 7.2/12kV switchgear, connection at rear

技术数据 Technical Data

安装说明

关于开关室的设计资料
应该参照附表及第12页的图样来规划开关装置室的布置

- 单母线单排或面对面布置(图A或B)或
- 双母线面对面布置(图B)

Installation details

Planning the layout

The data given in the following tables and the figures on page 12 should be used for planning the layout of the switchgear room.

- Single busbars on single-row or face-to-face arrangement (Fig.A or B) or
- Duplicate busbars in face-to-face arrangement (Fig.B)

电缆室的释压板) Pressure relief[1] of connection compartment	安装在背后的释压通道 Rear-mounted[1] pressure relief duct	布置[1] Arrangement[1]	尺寸 Dimension a	b	c	d	e
7.2/12kV, 从前面接线 7.2/12kV. connection at front							
向下 Downwards	无 Without	靠墙 WALL	≥ 1100	33	1620	50	≥ 1300
到后面 To rear	无 Without	靠墙 WALL	≥ 1100	33	1620	150	≥ 1300
向上 Upwards	有 With	靠墙/单独竖立 Wall/Free-Stand.	≥ 1100	33	1745[2]	min.50[2]	≥ 1300
7.2/12kV, 从后面接线 7.2/12kV. connection at rear							
向上 Upwards	有 With	单独竖立 Free-standing	≥ 1100	33	1745	min.500	≥ 1300

- 双母线背靠背布置(图C)
- Duplicate busbars in back-to-back arrangement (Fig.C)

电缆室的释压板[1] Pressure relief[1] of connection compartment	安装在背后[1]的释压通道 Rear-mounted[1] pressure relief duct	布置[1] Arrangement[1]	尺寸 Dimension a	b	c	d	e
7.2/12kV, 从前面接线 7.2/12kV. connection at front							
向上 Upwards	有 With	单独竖立 Free-standing	≥ 1100	33	1620	—	—

地板承受的负荷
Floor loading

开关柜 Panel	单母线柜或双母线柜面对面布置时各柜的重量 Single busbar panels or duplicate busbar panels in face-to-face arrangement Weight of individual panels	双母线柜，背靠背布置并装有两台断路器的重量 Duplicate busbar panels in back-to-back arrangement equipped with two circuit-breakers Weight
7.2/12kV	约重 approx.700-1200kg	约重 approx.1400-2000kg

固定方法

开关装置可用下述方法紧固：

- 用螺栓固定到基础轨道上
- 焊接在基础轨道上
- 基础轨道的位置由开关柜底架上固定点的位置来决定(参阅第11-12页)
- 更详细的说明参见使用说明书

1) 也可参阅第30页开关柜的接线方式
2) 对7.2/12kV额定短路开断电流为50kA的开关柜，只能从前面接线，后面安装释压通道。
开关装置与后墙之间的距离至少要有500mm，在此距离情况下，必须有盖板。

Fixing

The switchgear can be fixed by:

- Bolting to the foundation rails
- Welding to the foundation rails
- The position of the foundation rails is governed by the fixing points in the panel base frames (see page 11 to 12)
- Further details are given in the operating instructions.

1) See also under Panel connection, page 30.
2) For switchgear with rated short-circuit breaking current 50 kA at 7.2/12kV only connection at front and with rear mounted pressure relief duct is feasible.
Rear distance between switchgear and wall must be 500mm at least.
For this rear distance, cover plates must be provided.

技术数据 Technical Data

关于开关室的设计资料

下面各图以及第 13及14页表格中提供的数据，可用作开关室的设计资料

Planning the layout

The data given in the following figures and the tables on page 13 and 14 should be used for planning the layout of the switchgear room.

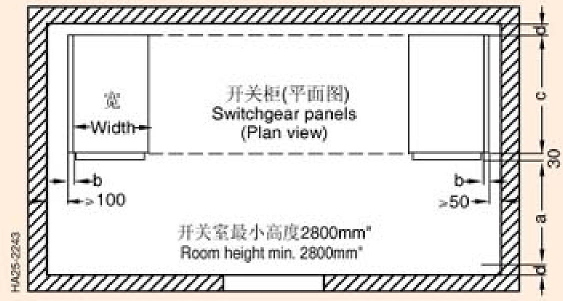


图 A 单排布置
Fig. A Single-row arrangement

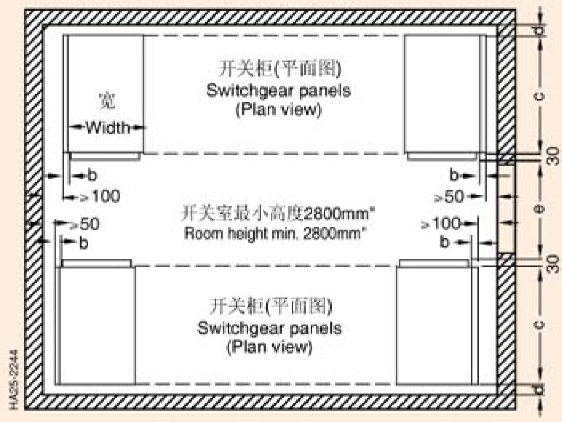


图 B 面对面布置
Fig.B Face-to-face arrangement

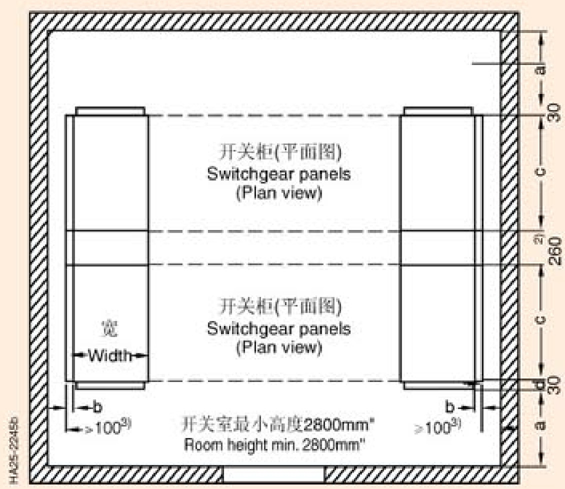


图 C 背靠背布置
Fig.C Back-to-back arrangement

1) 如室内高度较低，请咨询
2) 额定短路开断电流为 50kA 时：660 mm
3) 在开关室的一端必须有一条 1200mm 宽的通道，以便将可移开部分推入这一通道。

1) Ask for advice of the room height is less.
2) For rated short-circuit breaking current 50kA: 660mm.
3) There must be a 1200mm wide aisle at one end to wheel in the withdrawable section.

技术数据 Technical Data

运输说明
运输单元

在决定采用何种尺寸的运输单元时，下述因素应考虑在内：

- 现场运输工具
- 运输重量及尺寸
- 建筑物的通道尺寸

Shipping details
Transport units

The following factors should be taken into account when deciding on the size of transport units to be employed:

- Transport facilities on site
- Transport weights and dimensions
- Size of building doorways

运输单元 Transport unit	额定电压及宽度 Rated voltage and width
	7.2/12kV 800mm
单母线柜或面对面布置时的双母线柜中的单台柜 Single busbar panels or single panels of a duplicate busbar installation for face-to-face arrangement	最多3台柜 max. 3 panels
背靠背双母线柜 Duplicate busbar panels for back-to-back arrangement	最多2台柜 max. 2 double panels

包装
Packing

到达地 Destination	运输方法 Transport by	包装型式 Type of packing
中国 China	铁路及公路 Road and rail	开关柜放在木质底盘上，用聚乙烯薄膜袋罩在产品上。 Panels on pallets and open packing with polyethylene sheets covering the panels
国外 Overseas	水运 Ship	开关柜放在木质底盘上，上部及下部用聚乙烯薄膜密封，内部放干燥剂并用木箱板封装，最长储期6个月 Panels on pallets in sealed crates with upper and lower polyethylene sheets Welded together with desiccant bags and sealed wooden floor; max. storage: 6 months

技术数据 Technical Data

运输说明
运输尺寸及重量

Shipping details
Transport dimensions and weights

额定电压 Rated voltage	每个运输单元的开关柜数 Number of panels per transport	尺寸，体积及重量 Dimensions, volumes and weights				
		宽 Width	深 Depth	高 Height	体积 Volume	总重约 Gross weight approx.
unit		m	m	m	m	kg

中国国内包装
China

从前面接线[1] 后面不装有压力释放通道
Connection at front[1]. without rear-mounted pressure relief duct

7.2/12kV	1 台柜 1 panel	1.06	1.90	2.25	4.53	770
	2 台柜 2 panels	1.90	1.90	2.25	8.12	1540
	3 台柜 3 panels	2.66	1.90	2.25	11.37	2300

从前面接线[1] 后面装有压力释放通道或从后面接线
Connection at front[1]. with rear-mounted pressure relief duct, or connection at rear

7.2/12kV	1 台柜 1 panel	1.06	2.08	2.25	4.96	770
	2 台柜 2 panels	1.90	2.08	2.25	8.90	1530
	3 台柜 3 panels	2.66	2.08	2.25	12.48	2300

背靠背布置[2]
Back-to-back arrangement[2]

7.2/12kV	1 台柜 1 panel	1.06	4.00	2.30	9.75	1390
	2 台柜 2 panels	1.90	4.00	2.30	17.48	2780

国外
Overseas

从前面接线[1] 后面不装压力释放通道
Connection at front[1], without rear-mounted pressure relief duct

7.2/12kV	1 台柜 1 panel	1.06	1.90	2.41	4.85	1050
	2 台柜 2 panels	1.90	1.90	2.41	8.65	1880
	3 台柜 3 panels	2.66	1.90	2.41	12.15	2730

从前面接线[1]) 后面装有压力释放通道或从后面接线
Connection at front[1], with rear-mounted pressure relief duct, or connection at rear

7.2/12kV	1 台柜 1 panel	1.06	2.08	2.41	5.31	1080
	2 台柜 2 panels	1.90	2.08	2.41	9.47	1930
	3 台柜 3 panels	2.66	2.08	2.41	13.30	2770

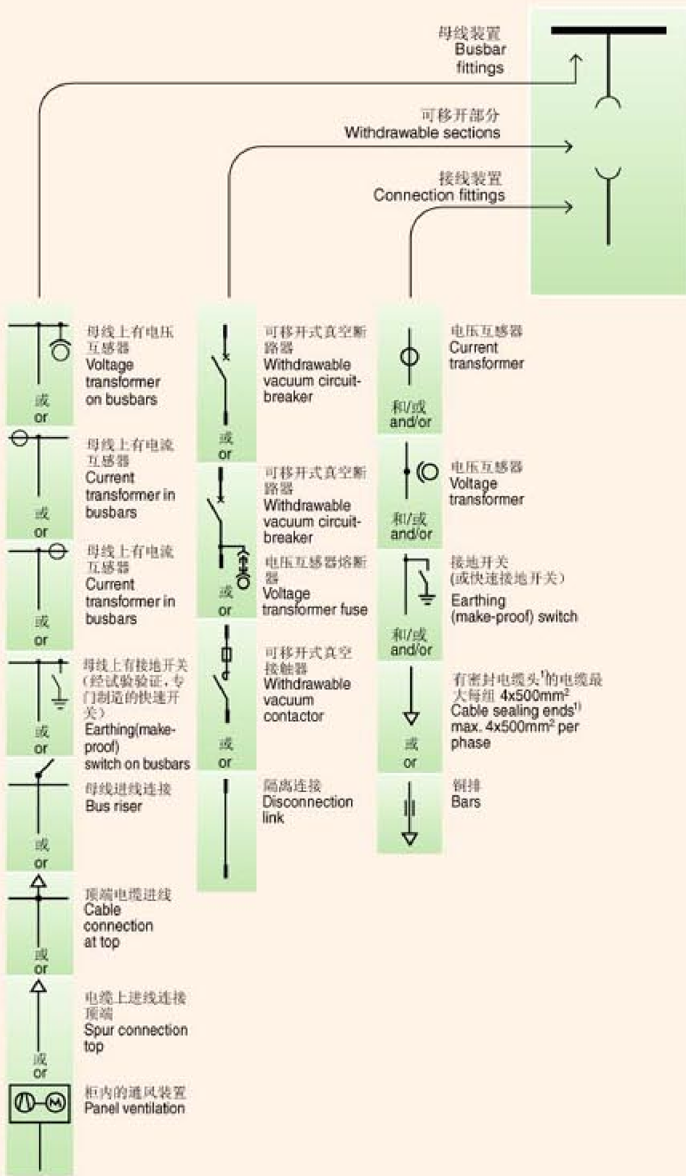
背靠背布置[2]
Back-to-back arrangement[2]

7.2/12kV	1 对柜 (2台) 1 panel	1.06	4.00	2.46	10.43	1950
	2 对柜 (4台) 2 panels	1.90	4.00	2.46	18.70	3460

1) 额定短路开断电流为50kA. 7.2/12kV开关装置只有从前面接线和后面装有压力释放通道是可行的，开关装置后面与墙之间的距离不得少于500mm，而且必须提供后盖板
2) 当柜内有2台可移开式断路器时净重增加约180kg。额定短路开断电流为50kA的开关装置体积也相应改变，深度增加0.4m
1) For switchgear with rated short-circuit breaking current 50 kA at 7.2/12kV only connection at front and with rear-mounted pressure relief duct is feasible.
Rear distance between switchgear and wall must be 500 mm at least.
For this rear distance cover plates must be provided.
2) The gross weight increases by about 180kg when there are two withdrawable circuit-breakers in a panel. The depth will be increased to 0.4m for switchgear with rated short-circuit breaking current 50 kA up at 7.2/12kV,
The volume will change accordingly.

单母线柜
可移开式柜

Single busbar panels
Withdrawable panel

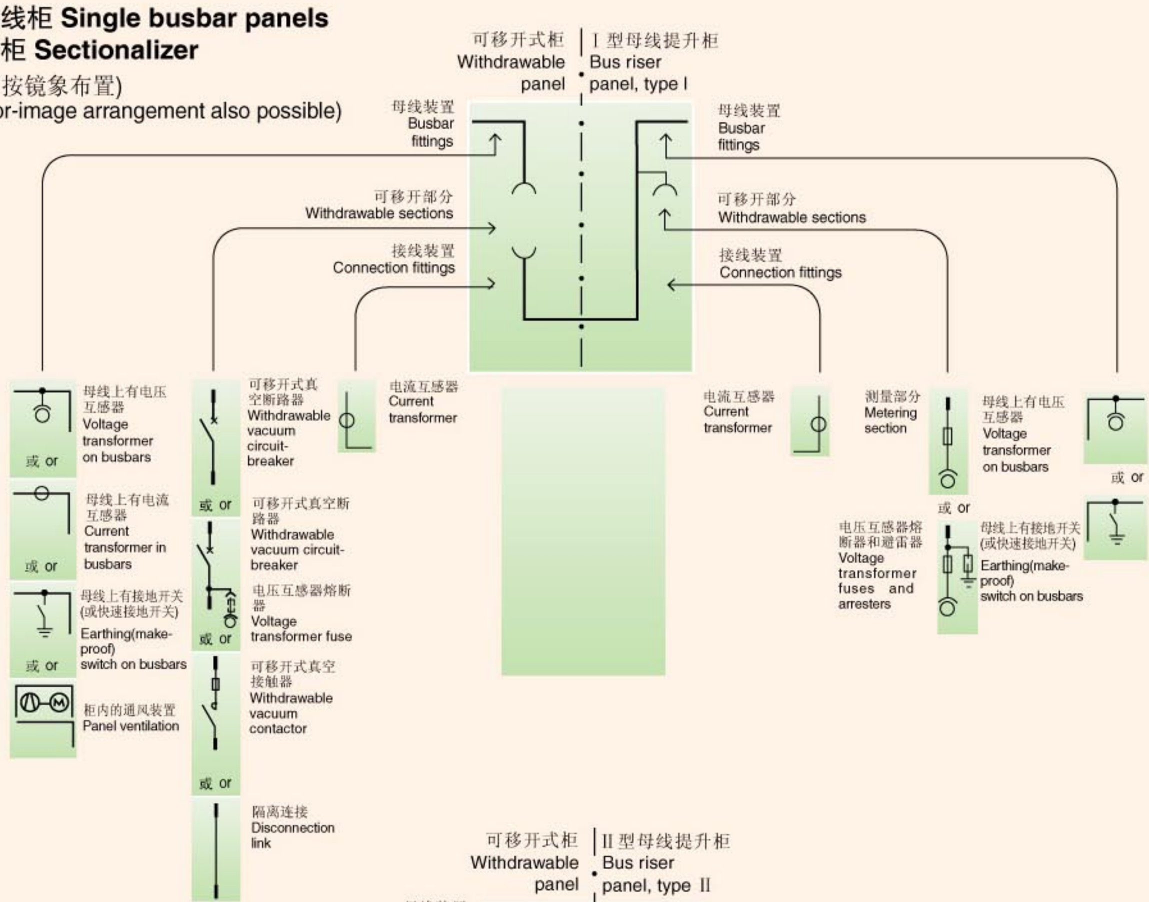


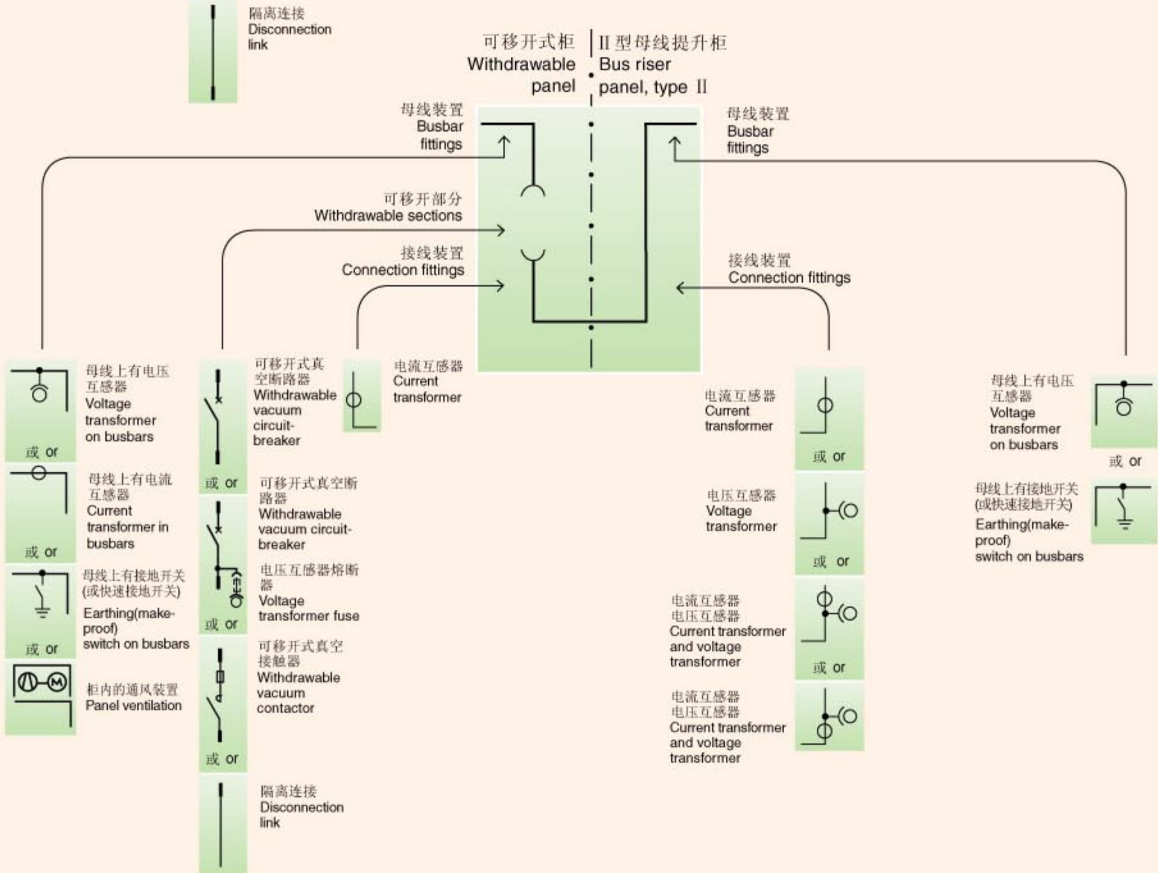
1) 西门子通常采用的交联聚乙烯单芯密封电缆头或类似尺寸的其它产品。
Siemens conventional single-core sealing ends for XLPE cables or other makes with similar dimensions.

一次方案 Product Range

单母线柜 Single busbar panels
分段柜 Sectionalizer

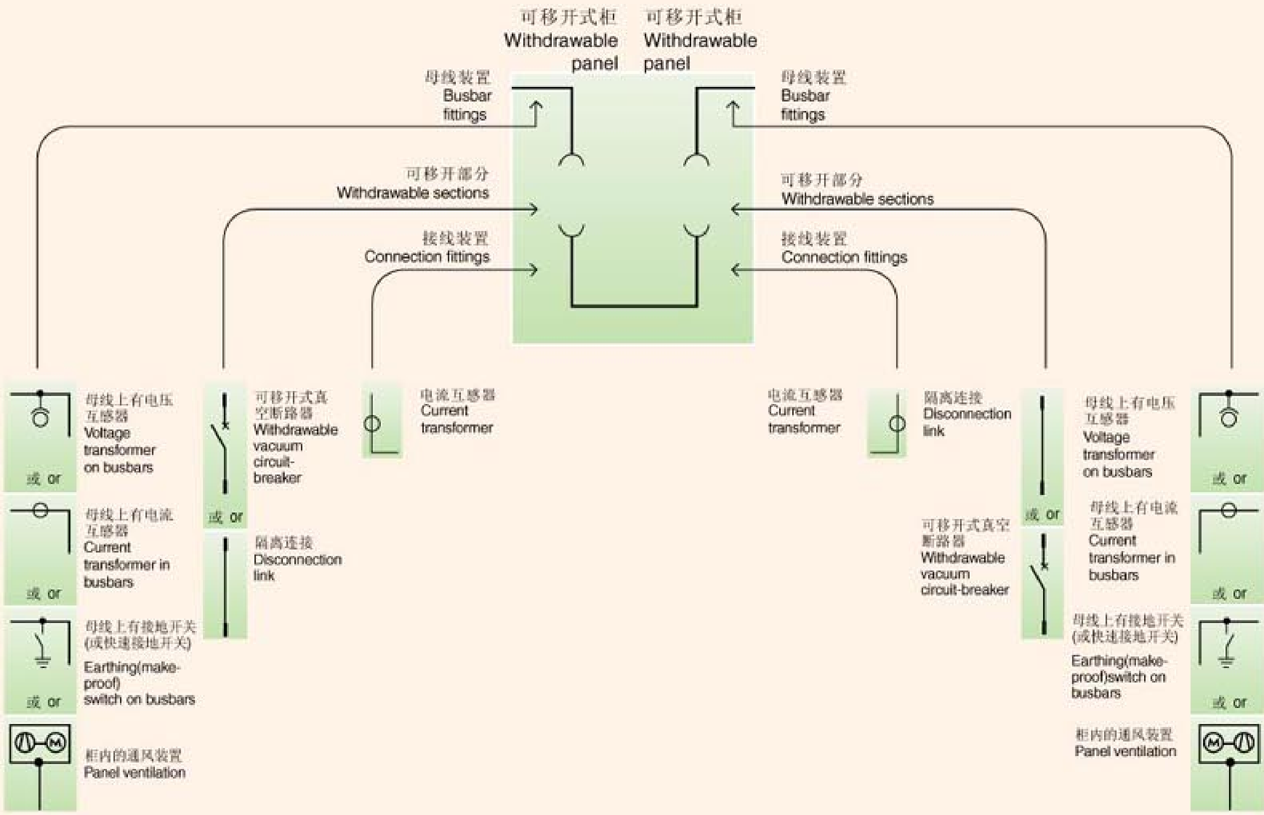
(亦可按镜象布置)
(mirror-image arrangement also possible)





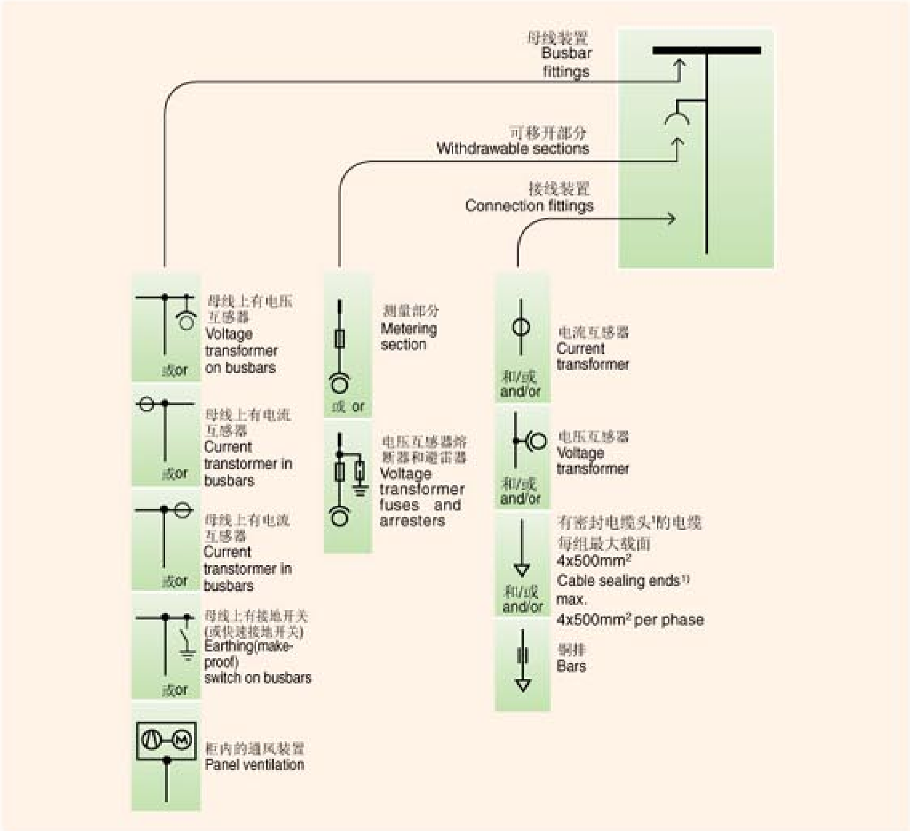
单母线柜
分段柜

Single busbar panels
sectionalizer

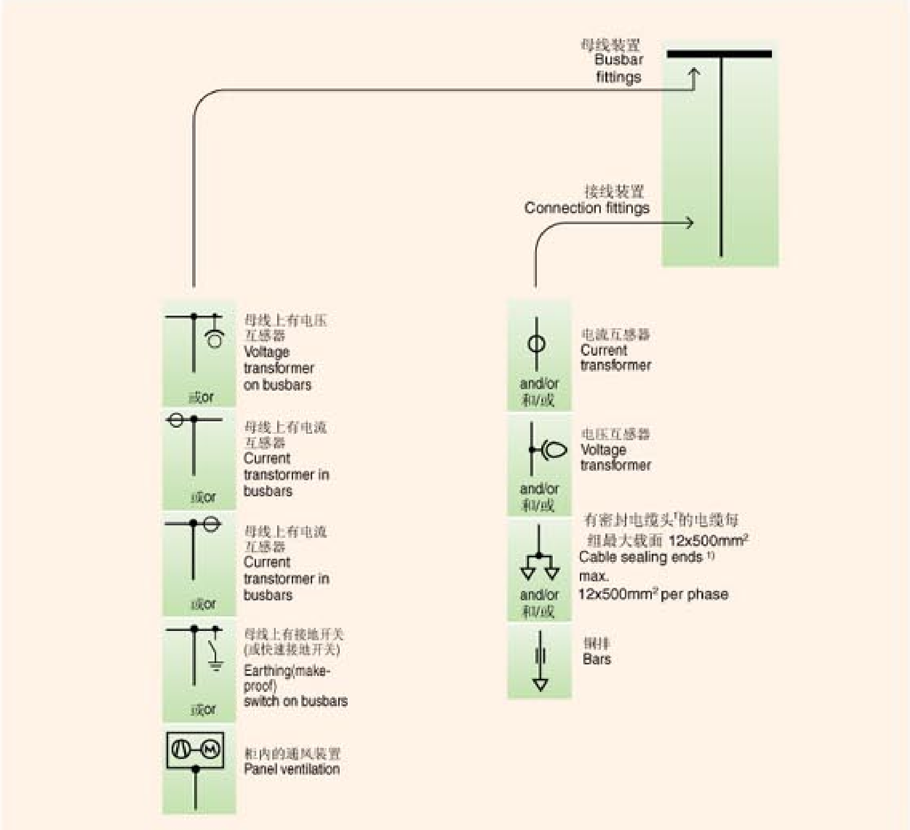


一次方案 Product Range

单母线柜
Ⅰ型母排接线柜
Single busbar panels
Busbar connection panels
Type Ⅰ



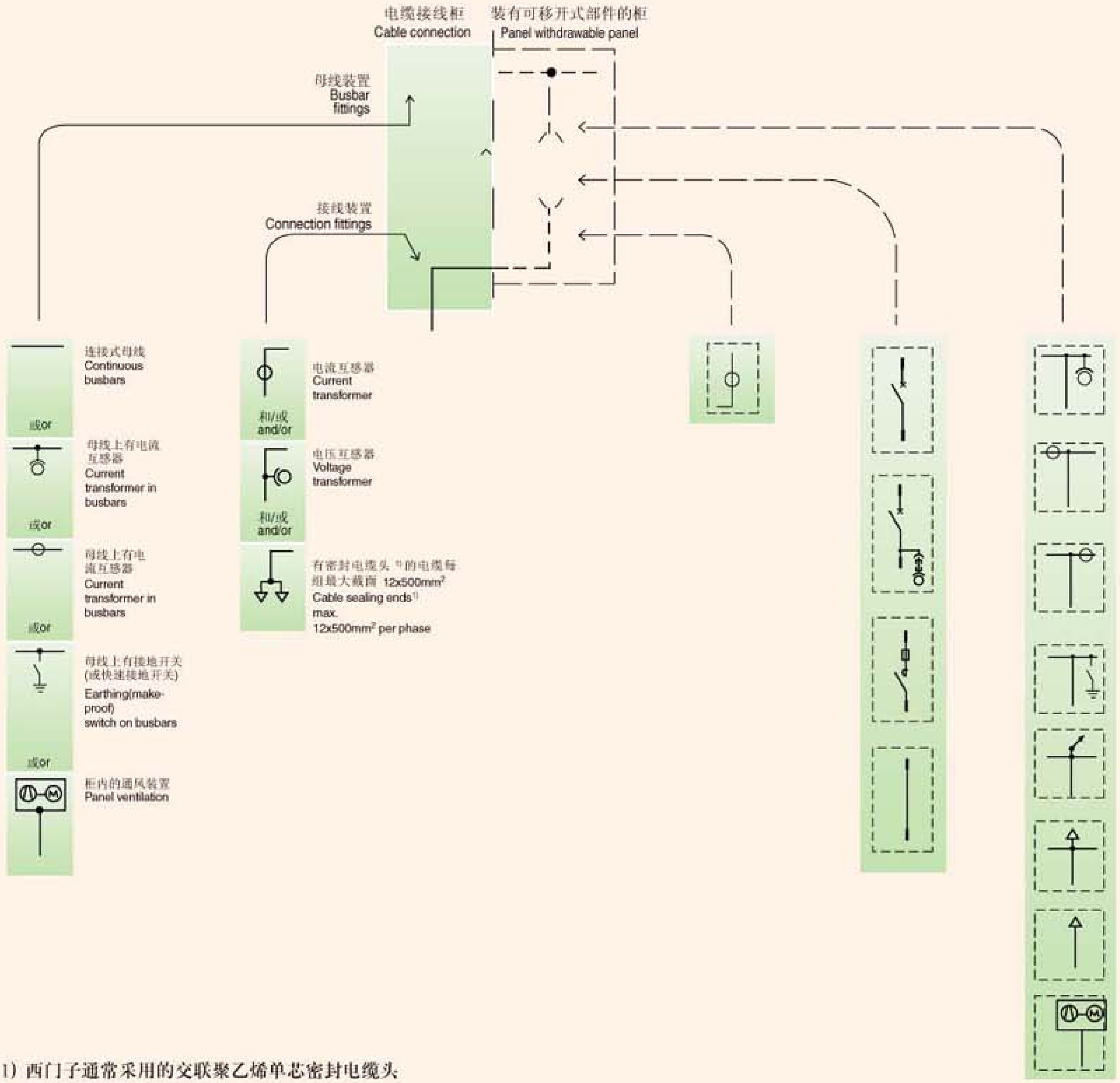
Ⅱ型母排接线柜
Busbar connection panels
Type Ⅱ



1) 西门子通常采用的交联聚乙烯单芯密封电缆头或类似尺寸的其它产品。
Siemens conventional single-core sealing ends for XLPE cables or other makes with similar dimensions.

单母线柜
电缆接线柜
Single busbar panels
Cable connection panel

（亦可按镜象布置）
(mirror-image arrangment also possible)



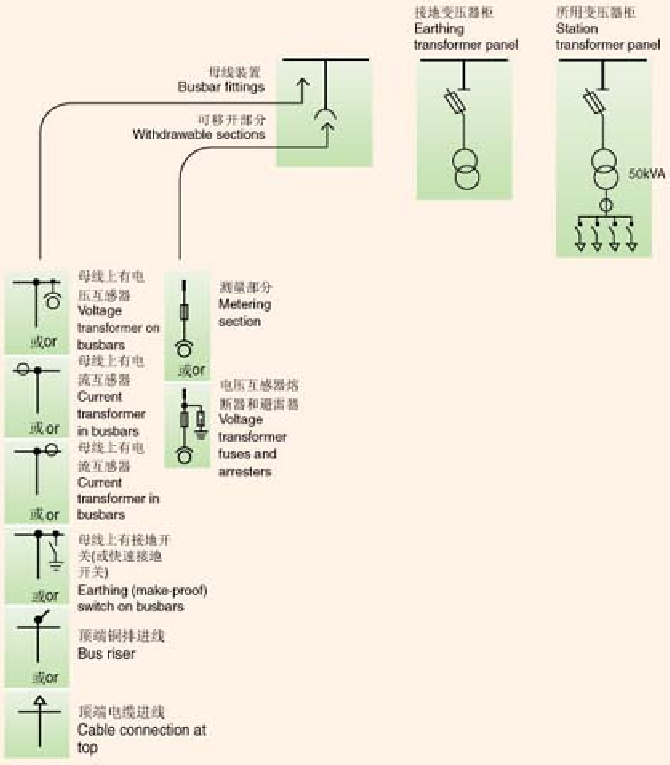
1）西门子通常采用的交联聚乙烯单芯密封电缆头或类似尺寸的其它产品。

1) Siemens conventional single-core sealing ends for XLPE cables or other makes with similar dimensions.

一次方案 Product Range

单母线柜
可移开式测量柜

Single busbar panels
Metering panel, withdrawable type



双母线柜 Duplicate busbar panels

8BK20双母线开关装置由单母线柜组合而成，它们可有以下方式：

- 面对面布置或
- 背靠背布置

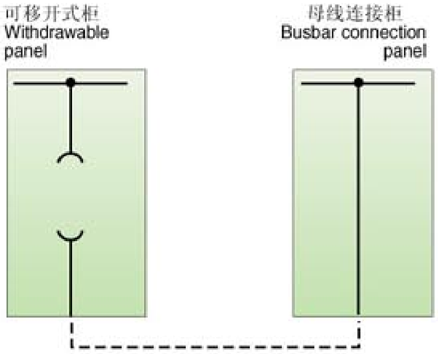
8BK20 duplicate busbar switchgear is assembled from the range of single busbar panels.they can be arranged either:

- Face-to-face or
- Back-to-back

面对面布置 Face-to-face arrangement

- 柜的方案与单母线柜相同
- 两排柜由电缆连接或经由地下的铜排连接
- 母线耦合柜包含有可移开式柜和母排连接柜

- Panels from the single busbar product range
- The two rows are linked by cables or bars underneath the panels
- Bus coupling, comprising withdrawable panel and busbar connection panel

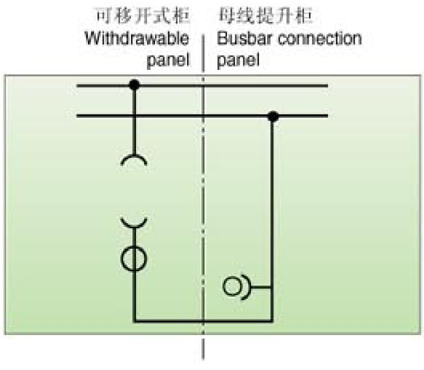


背靠背布置

- 柜的方案与单母线柜相同
- 两排柜由柜内的铜排连接
- 母线耦合柜包含有：
- 可移开式柜，但仅有电流互感器及一种特殊的母线耦合与提升柜
- 母线上的装置有将母线分为单母线的作用

Back-to-back arrangement

- Panels from the single busbar product range
- The two rows are linked by bars inside the panels
- Bus coupling, comprising:
- Withdrawable panel, but only with current transformer and a special bus coupling and riser panel
- Fittings on the busbars as for sectionalizing single busbars

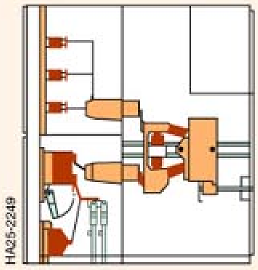


单母线柜
可移开式真空断路器柜

- 用途
  用于控制变压器、电动机、电容器、电缆、架空线，
  还可作为联络柜
- 特点
- 用继电器作短路保护
- 额定短路开断容量最大可达 50kA
- 额定电流开断能力最大可达 4000A
- 工作寿命
  额定短路开断电流约 100次，额定电流约30,000次
- 电缆接线方式
  从前面接线，可选择装在后面的电缆室压力释放通道。
  从后面接线，并在后面装有电缆室压力释放通道。

Single busbar panels Withdrawable vacuum circuit-breaker panel

- Application
  For switching transformers, motors, capacitors, cables,overhead lines and ties.
- Special features
- Short-circuit protection by relay
- Max rated short-circuit breaking capacity up to 50kA
- Max rated breaking capacity up to 4000A
- Operating frequency:
  Rated short-circuit breaking current up to approx.100 x Isc
  Rated current up to approx.300,000x In
- Cable connection
  at front,optionally with rear-mounted pressure relief duct for connection compartment.
  at rear,with rear-mounted pressure relief duct for connection compartment.



7.2/12kV

可移开式真空断路器柜(剖面图)
Withdrawable vacuum circuit-breaker panel (sectional view)

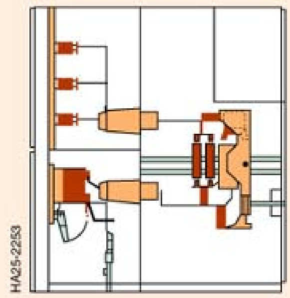
电气设计部分 Electrical Design

单母线柜
可移开式真空接触器柜

- 用途
  用于控制容量约达 630kVA变压器、功率约达 1100kW 的电动机以及电容器组
- 特点
– 用高压限流熔断器作短路保护
– 额定短路开断容量：同高压限流熔断器的开断容量
– 额定电流可达 400A
– 工作寿命：开断额定电流可达一百万次。
– 电缆接线方式[1]
  从前面接线，接线室可选择在后面安装的电缆室压力释放通道，从后面接线，并在后面装有电缆室压力释放通道。

Single busbar panels
Withdrawable vacuum contactor panel

- Application
  For switching transformers up to about 630 kVA. motors up to about 1100kW and capacitors.
- Special features
– Short-circuit protection by HV HRC fuses
– Rated short-circuit breaking capacity: breaking of short-circuit current by HV HRC fuses
– Rated breaking capacity up to 400A
– Operating frequency:
  Rated current up to 1 million × In
– Cable connection [1]
  at front,optionally with rear-mounted pressure relief duct for connection compartment.
  at rear,with rear-mounted pressure relief duct for connection compartment.



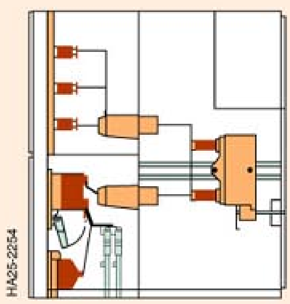
可移开式真空接触器柜(剖面图)
Withdrawable vacuum contactor panel (sectional view)

隔离排连接柜

- 用途
用于将与母线连接的部份分隔开来
- 特点
– 短路保护：应用主断路器
– 额定短路开断容量：用主断路器开断短路电流
– 额定开断容量：无开断容量
– 工作寿命：机械寿命 1000次，空载分合
– 电缆接线方式[1]
  从前面接线[1]可选择在后面安装的电缆室压力释放通道，从后面接线并在后面装有电缆室压力释放通道。

Disconnector-link panel

- Application
  For isolating a connection to the busbar.
- Special features
– Short-circuit protection: by master-circuit breaker
– Rated short-circuit breaking capacity:
  breaking of short-circuit current by master circuit-breaker
– Rated breaking capacity: No breaking capacity
– Operating frequency:
  Mechanical, 1000 off-load switching cycles
– Cable connection [1]
  at front,optionally with rear-mounted pressure relief duct for connection compartment; at rear, with rear-mounted pressure relief duct for connection compartment.



隔离排连接柜(剖面图)
Disconnector-link panel (sectional view)

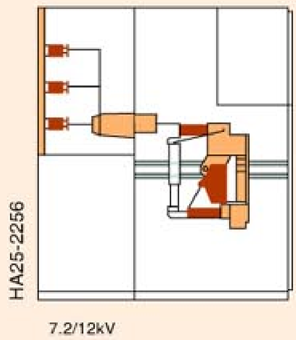
1) 还可参阅第 30 页开关柜的接线方式
1) See also under Panel connection, page 30

单母线柜
可移开式测量柜

- 用途
- 测量母线电压
- 将电压互感器与母线隔离开来
- 在电压互感器初级安装熔断器
- 特点
- 只有在可移开部分处于断开位置，母线室被隔开时，才可接触电压互感器
- 互感器次级电路被切断
- 高压室门打开

Single busbar panels
Metering panel, withdrawable

- Application
- Measurement of busbar voltage
- Isolation of voltage transformers from busbars
- Primary-side fusing of voltage transformers.
- Special features
- Access to voltage transformers only possible when withdrawable section in disconnected position ,busbar thus compartmentalized
- Transformer secondary circuits isolated
- High-voltage compartment door open.



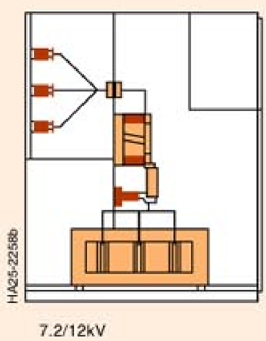
可移开式测量柜(剖面图)
Metering panel, withdrawable(sectional view)

接地变压器柜

- 用途
- 为中性点绝缘运行或经高阻接地运行系统中的发电机提供接地保护装置所需电能
- 接地变压器具有附加的绕组可用于测量电压和配合保护装置
- 特点
- 短路保护：由熔断器隔离开关中的高压限流熔断器来承担
- 额定短路开断容量：按高压限流熔断器
- 额定开断容量：没有
- 工作寿命：1000次空载机械操作
- 只有在熔断器隔离开关处于断开位置，高压室门打开，而且在活门关闭后，才可接触接地变压器

Earthing transformer panel

- Application
- Provision of required power for earthfault protective devices for generators in systems with isolated or high-resistance earthed neutral
- Earthing transformer with additional measuring winding for voltage measurements and protective devices.
- Special features
- Short-circuit protection:by HV HRC fuses of the fused switch disconnector
- Rated short-circuit breaking capacity:by HV HRC fuse
- Rated breaking capacity: No breaking capacity
- Operating frequency: Mechanical, 1000 off load switching cycles
- Access to earthing transformer only possible when fused switch disconnector in Off position, high-voltage compartment door open, after that the protective barrier for shielding the busbar voltage must be inserted.



接地变压器柜(剖面图)
Earthing transformer panel (sectional view)

电气设计部分 Electrical Design

单母线柜
分段柜

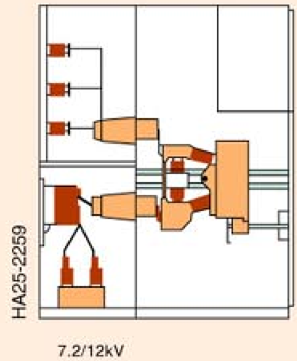
• 用途
用于母线部分的耦合，此时可使用真空断路器，真空负荷开关或隔离铜排

• 特点
- 分段柜包含有一台可移开式柜（参阅第23 页和第24 页）和一台 I 型或 II 型母线提升柜
- I 型母线提升柜内的可移开部分装有电压互感器，可选择在其初级侧安装熔断器。
只有在可移开部分处于断开位置，母线室被封闭，而且互感器次级回路被切断时，才可接触电压互感器。
- II 型母线提升柜装有固定式电压互感器，在其初级不装熔断器。只有在母排被隔离而且操作人员将之接地，并打开由螺栓紧固的门之后，才可接触电压互感器。
- 在可移开部分与母线进线柜之间的连接铜排位于封闭的柜体内。

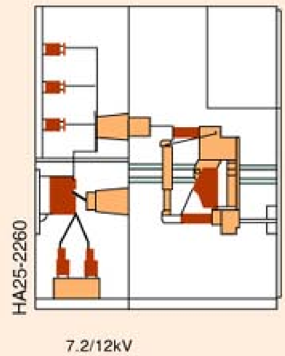
Single busbar panels
Sectionalizer

• Application
For coupling busbar sections with either vacuum circuit-breaker,vacuum switch or disconnector link.

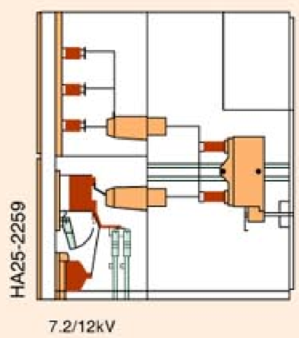
• Special features
- A sectionalizer comprises a withdrawable panel see page 23 and 24 and a bus riser panel type I or II
- Type I bus riser panel with voltage transformers optionally with primary fuses on withdrawable section.
Access to voltage transformers only possible when:
withdrawable section in disconnected position,busbars thus compartmentalized and transformer secondary circuits isolated.
high-voltage compartment door open
- Type II bus riser panel with fixed-mounted voltage transformers, without primary fuses.
Access to voltage transformers only possible when:
busbar isolated and earthed by operating personnel.
screw-fixed door opened with tools.
- Connector bars between withdrawable and bus riser panel inside the enclosure



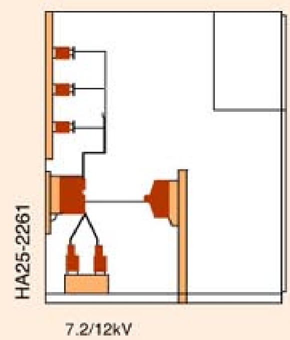
可移开式柜(部面图)
Withdrawable panel (sectional view)



I 型母线提升柜(剖面图)
Bus riser panel, type I (sectional view)



可移开式柜(剖面图)
Withdrawable panel (sectional view)



II 型母线提升柜(剖面图)
Bus riser panel, type II (sectional view)

单母线柜
母线接线柜

- 用途

直接将电缆或铜排与母线连接

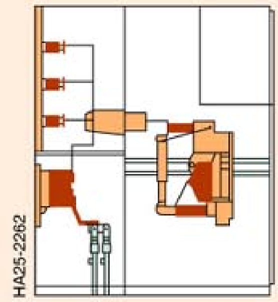
- 特点

– Ⅰ型母线接线柜：

有电压互感器，在可移开式测量部分的电压互感器初级上装有熔断器。从前面进行电缆接线[1] 每相最大可接 4 根 500mm² 截面单芯交联聚乙烯电缆。只有在下列情况下才可接触电压互感器：可移开部分在断开位置，母线隔室被隔离封闭，以及互感器次级回路被切断，高压室门打开。

– Ⅱ型母线接线柜：

电压互感器固定安装，初级无熔断器，从前面进行电缆连接，每相最多可接12 根 500mm² 截面交联聚乙烯单芯电缆。只有在下述情况下，才可接触电压互感器：母线由操作人员将之隔离并接地，打开用螺栓紧固的门。



Ⅰ型母线接线柜（部面图）
Busbar connection panle,type I (sectional view)

Single busbar panels
Busbar connection panels

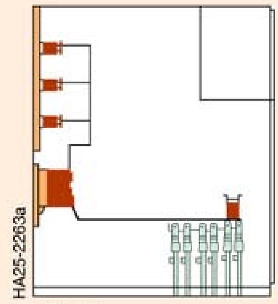
- Application

Direct connection of cables or bars to the busbars.

- Special features

– Type I busbar connection panel:with voltage transformers, with primary fuses, on withdrawable metering section. Cable connection from front: max.4 x500mm² single-core XLPE cables per phase[1]. Access to voltage transfomers only possible when withdrawable section is in disconnected position,busbars thus compartmentalized and transformer secondary ciruits isolated, high-voltage compartment door open.

Type II busbar connection panel: with fixed mounted voltage transfromers, without primary fuses.Cable connection from front: max 12x 500mm² sigle-core XLPE cables per phase [1]). Access to voltage transformer only possible when: busbar isolated and earthed by operating personnel. screw-fixed door opened with tools.



Ⅱ型母线接线柜（部面图）
Busbar connection panle,type II (sectional view)

电缆接线柜

- 用途

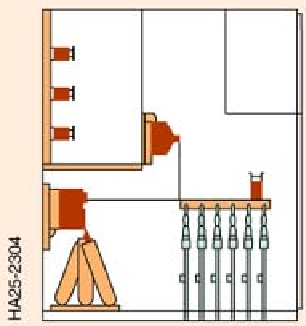
当相邻柜之间用绝缘母排连接时，在此种情况下，应用电缆接线柜。

- 特点

– 当相邻柜之间用绝缘母排连接时，在此种情况下，应用电缆接线柜。
– 用螺栓紧固的门，必须使用工具才可将之打开。
– 从前面进行电缆连接

Cable connection panels

- Application
  - For connecting to an adjacent withdrawable panel inside the enclosure with fully insulated bars
- Special features
  - For connecting to an adjacent withdrawable panel inside the enclosure with fully insulated bars
  - Bolted door, removable only with tools
  - Cable connection from front.



电缆接线柜（剖面图）
Cable connection panels (section view)

1) 西门子通常采用的密封电缆头或类似尺寸的其他产品。

1) Siemens conventional sealing ends or other makes with similar dimensions

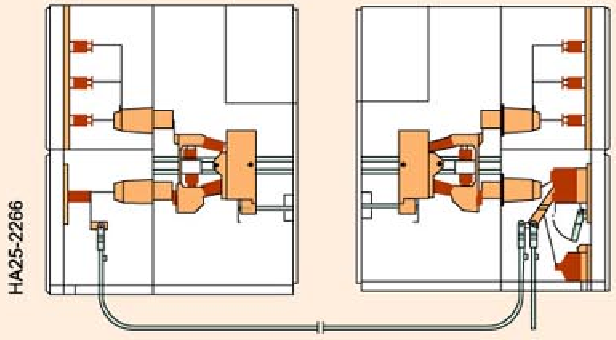
电气设计部分 Electrical Design

双母线柜
面对面布置

- 用途
  双母线柜主要使用在下述场合：
- 需要高度可靠的连续供电
- 更换母线时不允许有停电间隔
- 用于发电厂出线的切换或者重要负荷非重要负荷的切换
- 面对面布置特点
- 无需断开另一段母线，即可检查某一段母线
- 只需一个通道
- 更换母线操作的这一段距离最短
- 整体布置清晰[1]
- 在同一柜内可布置电缆接线，接地开关，电流互感器，电压互感器
- 使用特殊的终端连接装置，因此仅需一台电流互感器
- 可移开部分接地开关有机械和电气联锁
- 在现场，用电缆或铜排在电缆沟内将两排开关柜连接在一起
- 在现场，可方便地将低压控制线接到对面柜上

Duplicate busbar panels
Face-to-face arrangement

- Application
  Duplicate busbar installations are mainly used:
- In stations requiring a very high security of supply
- For no-break busbar changeover
- For separating on-plant and off-plant generation or essential and nonessential loads.
- Special features of face-to-face arrangement
- Inspection of a busbar system possible without isolation of the second system
- Only one access aisle required
- Short distances for busbar changeover
- Clear overview
- Cable connection,earthing switch,current and voltage transformers in the same panel
- With special terminal links only one set of current transformers needed
- Mechanical and electrial interlocking of withdrawable sections / earthing switch
- On-site linking of the two rows by cables or bars in cable basement
- On-site wiring of LV circuits to facing panel.



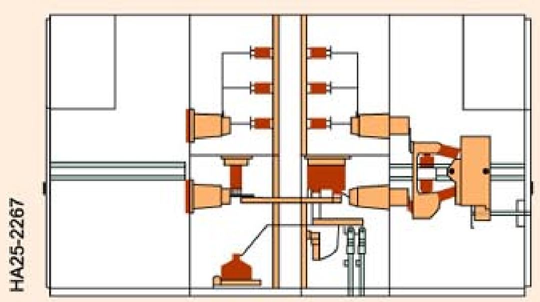
面对面布置
Face-to-face arrangement

背靠背布置

- 用途
  与面对面布置相同
- 背靠背布置特点
- 无需断开另一段母线即可检查某一段母线
- 两柜在其内部用铜排连接，此工作在制造厂内完成
- 制造厂完成柜内接线
- 可移开部分与接地开关机机械联锁
- 仅需一组电流互感器
- 在同一柜内，可布置电缆接线，接地开关与电流互感器。

Back-to-back arrangement

- Application
  as for face-to-face arrangement.
- Special features of back-to-back arrangement
- Inspection of a busbar system possible without isolating the second system
- Panels linked by bars inside the enclosure,factory-tested
- Wiring of LV circuits inside enclosure factory-tested
- Mechanical interlocking of withdrawable sections/earthing switch,factory-tested
- Only one set of current tranformers needed
- Cable connection,earthing switch and current transformers in the same panel.



背靠背布置
Back-to-Back arrangement

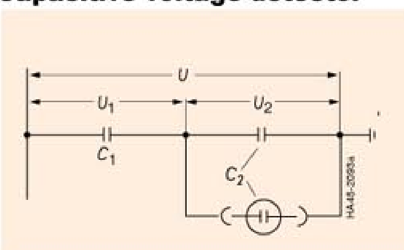
联锁

当联锁条件满足后，可以进行下述操作：
- 将可移开部分从断开位置移至工作位置：
  低压插头插入
  高压室门关闭[1]
  接地开关在断开位置
- 将可移开部分从工作位置移至断开位置：断路器分闸
- 操作断路器：
  处于分间状态的断路器只有在位于紧靠门内的位置和工作位置时，才可操作。处于这两个位置之间的任何位置上，断路器均不能被操作。
- 操作接地开关
  可移开部分已退至紧靠门后的位置[1]
- 打开高压室门
  可移开部分已退至紧靠门后的位置[1]

Interlocking

The following operating procedures can be carried out as soon as the interlocking conditions have been satisfied:
- Moving of the withdrawable section from the disconnected position to the connected position:
  LV connector plugged in
  HV compartment door closed[1]
  Circuit-breaker in the OPEN position
  (Make-proof) earthing switch
  in the OPEN position[1]
  Moving of the withdrawable section from the connected position to the
- disconnected position:
  Circuit-breaker in the OPEN position
  Operating the circuit-breaker:
  Withdrawable section in the interlocked
- end position
  Operating the (make-proof) earthing switch:
- Withdrawable section in the interlocked disconnected position[1]
  Opening the HV compartment door:
  Withdrawable section in the interlocked disconnected position[1]

容性带电显示器
Capacitive voltage detector



- 原理
- 电容 C_1是在电流互感器或环氧树脂浇铸绝缘子内由分压器决定的一个电容
- 电容 C_2是由导体和显示器对地电容构成的另一个电容
- 特点
- 将显示器逐步插入到各个插座中，即可一相一相地检查是否带电
- 如果某相有高压，显示器将会闪烁
- 还可以在一对插座中进行相位比较
- 带电显示装置可以长期工作，显示器可永久插入插座
- 该系统在所有工作状态下，都不会受断路器操作时的震动而影响工作
- 该系统在出厂试验时，已经过检验
- 此种显示器可以接在任何交流电源电压4-5V的插座中进行测试
- 标准与技术条件
- 检测器的规范符合 VDE0681，第 4 部分（电压测试器）的规定
- VDE 标准正在考虑将这一系统做为检查带电并验证设备是否与电源脱离的基本手段

- Principle
- The capacitance C_1 is provided by suitable grading layers in the current transformer or cast-resin insulators
- The capacitance C_2 is provided by the capacitance of the conductors and the voltage detector to earth.
- Special features
- The voltage detector is plugged into pairs of sockets (in the door of the LV compartment)for pole-by-pole
  verification of safe isolation from supply
- The voltage detector flashes if there is an HV supply present
- Phase comparison at the pairs of sockets is possible
- The voltage detector is designed for continuous operation and can remain permanently plugged in
- The system is shock-proof in all operating states
- The system is routine-tested at the factory
- The voltage detector can be tested in any mains socket outlet with an AC supply 4-5V
- Standards and specifications
- The range of the detector complies with VDE0681, Part 4 (specifications for voltage testers)
- VDE regulations for this type of system to be accepted as the sole means of verifying safe isolation from supply are in preparation.

高压室
母线

- 材料
  普通扁铜排，很容易在市场上购买
- 母线安装
- 在标准型环氧树脂浇铸的绝缘子上
- 母线与母线之间用螺栓紧固在一起，长度要根据柜的宽度。
- 母线室的隔离
- 可移开部分与电缆或铜排接线在各自的金属铠装隔室中，防护等级为 1P4X / IP40。
- 在整排开关装置中，母线室可以是贯穿的，也可以在相邻两台柜之间设有隔板。
- 母线室可选用防止内部电弧故障型
- 绝缘
- 不需要对母线增加辅助的绝缘措施，因为它们已具有足够的绝缘强度。

High-voltage compartment
Busbars

- Material
- Normal commercial flat copper bar, easily available
- Busbar mounting
- On standard cast-resin insulators
- Busbars bolted together, length according to panel width
- Compartmentalization
- Metal cladding to withdrawable section compartment and connection
- Busbar compartment continuous throughout entire installation
- Barriers between neighbouring panels possible
- Busbar compartment optionally resistant to internal arcing.
- Insulation
- No busbar insulation needed since there is adequate electric strength without insulation



母线室
Busbar compartment

1)在DIN VDE0670第 6部分或IEC 出版物298规定之外增加的联锁
Additional interlocks in excess of DIN VDE0670, Part 6 or IEC Publication 298

Mechanical Design 机械设计部分

母线装置

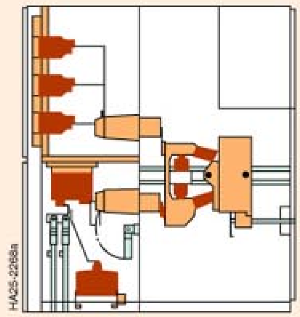
下述的母线装置可供选用：
这些母线装置对压力释放装置没有任何不利影响
• 电流互感器
– 环氧树脂浇铸支柱型电流互感器
– 严格按 DIN 42600 设计
– 最多可安装 3 台

Busbar fittings

The following optional fittings are available for the busbars.

They have no adverse effect on pressure relief:

• Current transformers
– Post-insulator current transformers, cast-resin insulated
– Narrow design to DIN 42600
– Max .3 x

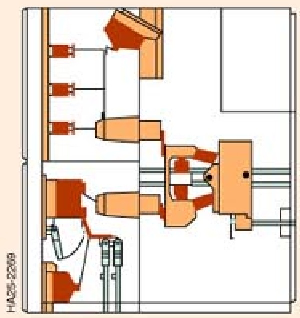


7.2/12kV

可移开式断路器柜 (剖面图)，在母线室装有三台电流互感器
Withdrawable vacuum circuit- breaker panel (sectional view) with three current transformers in the busbar run

• 或电压互感器
– 环氧树脂浇铸的
– 最多可安装 3 台单极式或二台双极式

• Or voltage transformers
– Voltage transformers, cast-resin insulated
– Max .3 x single pole or 2 x two pole

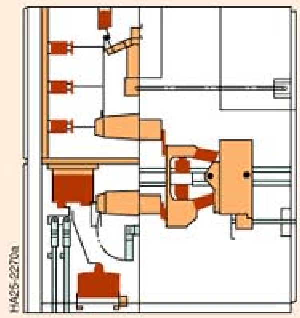


7.2/12kV

可移开式断路器柜 (剖面图)，在母线室装有电压互感器
Withdrawable vacuum circuit- breaker panel (sectional view) with voltage transformers in the busbar run

• 或接地开关
– 手动操作
– 可选择通常的闭锁方式或电磁联锁

• Or earthing switch
– Manual operation
– Optional locking or electromagnetic interlocking



7.2/12kV

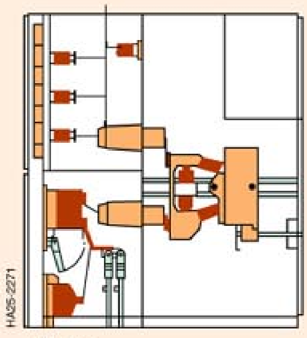
可移开式断路器柜 (剖面图)，在母线室装有接地开关
Withdrawable vacuum circuit- breaker panel (sectional view) with earthing switch on the busbar

母线装置(接上页)

- 或母线提升柜
- 额定电流对应母线最大额定电流
- 连接铜排安装在三个环氧树脂浇铸的绝缘子上
- 封闭母线桥架可根据需要加工

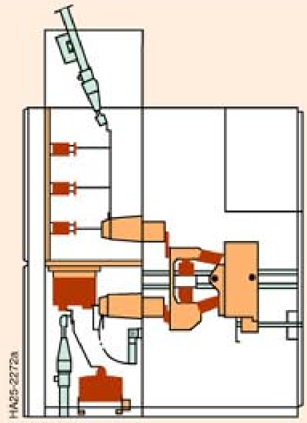
Busbar fitting
(continued)

- Or bus riser
- Rated current corresponding to max.
- rated busbar current
- Connecting bars mounted on three cast-resin insulators
- Required bus duct can be modified



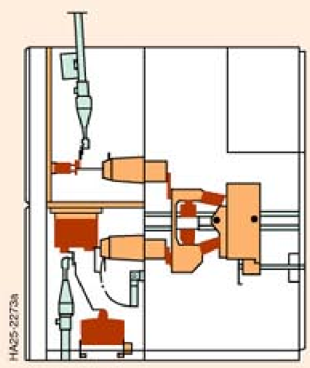
可移开式真空断路器柜(剖面图),母线提升式
Withdrawable vacuum circuit-breaker panel(sectional view) with bus riser

- 或电缆上进线
- 每相最多接 2 根500mm2 截面单芯交联聚乙烯电缆1)
- 设有电缆终端隔室，其中装有夹持件和支架。
- Or cable connection
- Max.2 x 500mm², single-core XLPE cables per phase1)
- With cable termination compartment and clamp support rail.



可移开式真空断路器柜(剖面图),用电缆与母线相连接
Withdrawable vacuum circuit- breaker panel (sectional view) with cable connection to busbars

- 或电缆上进线
  每相最多接2根500mm² 截面单芯交联聚乙烯电缆1)
- 电缆终端在柜内，并有夹持件和支架
- Or cable connection
- Max.2 x 500mm², single-core XLPE cables per phase 1)
- Cable termination inside the panel. with clamp support rail.



可移开式真空断路器柜（剖面图），用电缆与母线相连接
Withdrawable vacuum circuit- breaker panel (sectional view) with spur connection

1)西门子通常采用的密封电缆头或类似尺寸的其它产品。

1) Siemens conventional sealing ends or other makes with similar dimensions.

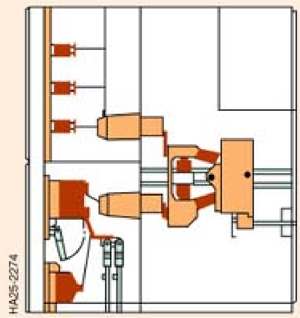
Mechanical Design 机械设计部分

开关柜的接线方式

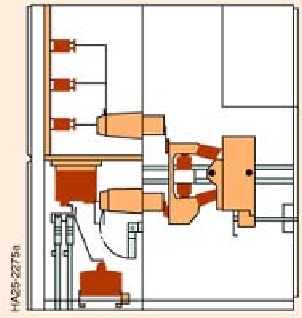
- 将电缆或铜排固定在电流互感器或绝缘子上进行接线
- 各种不同的接线安装方式见图示。
- 通过接地开关，直接在连接处将回路接地并短路
- 固定式的电压互感器处于电流互感器的保护范围内

Panel connection

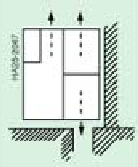
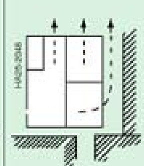
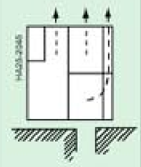
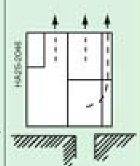
- Connection of cables or bars to current transformers or insulators
- Connection variants or types or installation are as shown in the illustrations
- Earthing and short-circuiting via earthing switch directly at the point of connection
- Fixed-mounted voltage transformers within the current transformer protection zone.



从前面接线
Connection from front



从后面接线
Connection from rear

				
接线方式 Connection	从前面 from front	从前面 from front	从前面1) from front1)	从前面 from front
电缆室的压力释放方向 Pressure relief of connection compartment	向下 downwards	到后面 to rear	向上 upwards	向上 upwards
装在后面的释放通道 Rear side duct	无 without	无 without	有1) with1)	有 with
安装方式 Installation	靠墙安装 Wall mounting	靠墙安装 Wall mounting	靠墙安装/自由竖立 Wall mounting free standing1)	自由竖立 Free standing
至墙之间距离 Wall clearance (mm)	50	150	min.50 1) 最小50 1)	min.500 最小500

柜内连接装置

下述器具或部件可供选择，用于相关的设计中：

- 每相最多可接 4 根 500mm² 单芯交联聚乙烯电缆及西门子密封电缆头，也可采用尺寸相近的其它产品
- 或用插拔式，防松密封电缆头连同底板
- 和/或用铜排连接
- 有套管的扁铜排，也可选择有绝缘层的铜排连同底板
- 和/或用电流互感器
- 环氧树脂浇铸的支柱型电流互感器
- 接近 DINCR600 设计要求的电流互感器
- 最多可安装 3 台
- 和/或用电压互感器
- 环氧树脂浇铸的电压互感器
- 最多 3 台单极或 2 台双极的电压互感器
- 固定式安装的，而且在初级没有熔断器
- 移开式安装的电压互感器，在初级装熔断器。互感器的电压输入来自断路器。当一次回路自动接地并切断次级回路后，才可接触电压互感器
  和/或用接地开关
- 手动，也可选用电动机驱动的 (在紧急操作时，永远可以手动) 接地开关
- 也可选用具有一定关合电流能力的快速接地开关
- 除了有标准的接地开关/可移开部分连锁外，还可选择附加的电磁联锁
- 和/或用避雷器或过电压限制器
- 避雷器用于保护开关装置，防止外来袭入的过电压
- 限制器用于保护负载，防止操作过电压的破坏
- 最多装 3 台

Panel connection fittings

The following optional fittings are available for panel connection according to the relevant project planning documentation:

- Connection of max. 4x 500mm² single-core XLPE cables per phase with Siemens sealing ends or other makes of similar size
- Or connections for plug-in, shock-proof sealing ends, including floor plate
- Or connection for bars:
  Flat copper bar with bushings, optionally with floor plate of fully insulated bars including floor plate

- And/or transformers
- 4MA post-insulator current transformers, cast-resin insulated
- Narrow design to DIN42600
  Max. 3X
- And/or voltage transformers
- 4MR voltage transformers, cast-resin insulated
- Max. 3X single-pole or 2X two-pole
- Fixed mounted, without primary fuses
- Withdrawable, with primary fuses
  voltage pickoff on the circuit-breaker.
  Automatic earthing or primary terminals and isolation of secondary circuits during access to voltage transformers
- And/or earthing switch
- Manual operation, optional motor drive, (manual emergency operation always possible)
- Optional making capacity
- Additional to standard interlocking of earthing switch/withdrawable section, optional locking or electromagnetic interlocking

- And/or surge arresters or surge limiters
- Limiters for protecting the loads against switching overvoltages
- Max. 3X

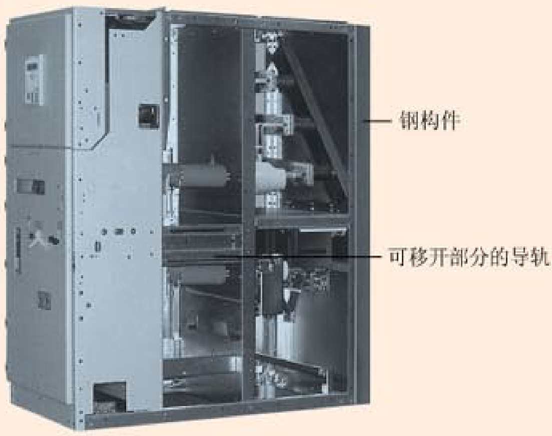
1) 对于7.2/12kV，短路开断电流50kA的开关装置，只能从前面接线而且在柜后装有压力释放通道。
柜的后面与墙之间的距离必须至少500mm。在这一距离内必须有盖板
For switchgear with rated short-circuit breaking current 50kA at 7.2/12kV only connection at front and with rear mounted pressure relief duct is feasible.
Rear distance between switchgear and wall must be 500mm at least.
For this rear distance cover plates must be provided.

机械设计部分 Mechanical Design

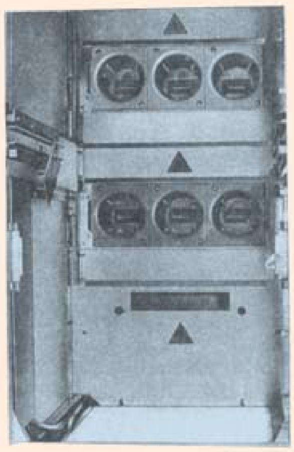
构架
- 结构
  - 用螺栓连接的钢构架和钢板组成
  - 可移开部分用导轨支撑
- 表面处理
  - 钢构件和钢板均镀锌
  - 门及前面框架喷浅灰色粉末涂层
  - 端板喷浅灰色粉末涂层

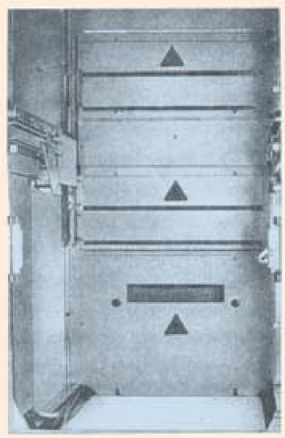
各室之间的分隔
- 结构
  - 用螺栓连接的镀锌钢板将开关柜分隔为：母线室，高压室和电缆室
  - 各单独隔室之间的防护等级为 IP4X/IP40
  - 由于使用插入式的绝缘套管，即使可移开部分在工作位置、各隔室之间也是不通的
  - 上部及下部的定触头固定在触头罩上
  - 在移动可移开部分时，通过机构，金属活门可开启或关闭
  - 当拉出可移开部分后，金属活门即盖住触头罩
  - 上部活门 (可接近母线) 或下部活门 (可接近电缆)，均可松开螺栓卸下来，相互之间没有联系

隔板
隔板的作用是将相邻小室分为互为不相通的隔室
- 结构
  - 镀锌钢板
  - 母线室可选用有套管的隔板，与相邻柜之间的防护等级为 IP4X/IP40
  - 相邻开关柜的母线室也可选择贯穿式的



隔板移开后的开关柜视图


活门开启后的插入式绝缘套管


活门关闭后盖住插入式绝缘套管


有隔板的开关柜

Mechanical Design 机械设计部分

Frame

- Construction
  - Bolted steel sections and sheets
  - Rails to support the withdrawable section
- Optional floor plate
- Surface treatment
  - Steel sections and sheet galvanized
  - Doors and front frame powder-coated, grey
  - Installation side panels powder-coated, grey

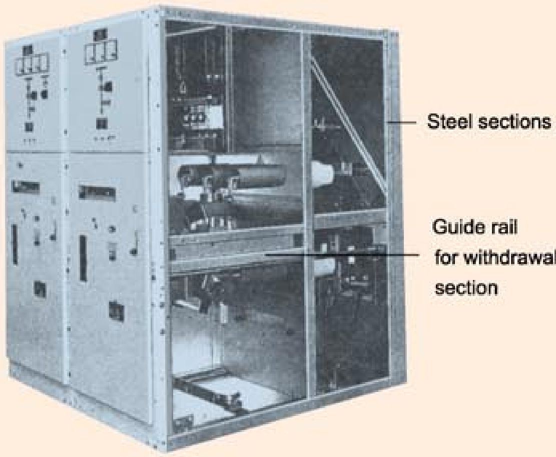
Compartmentalization

- Construction
  - Bolted galvanized steel sheets divide the panel into the busbar compartment,withdrawable section compartment and connection compartment
  - Degree of protection between individual compartments:IP4X/IP40
  - Complete compartmentalization maintained even with withdrawable section in connected position on account of the fitted penetration-type bushings
  - Upper and lower mating contacts fixed in penetration-type bushings
  - Enforced operated metal shutters for opening or closed the penetration-type bushings while the withdrawable section is being moved
  - Metal shutters can be locked when the withdrawable section is racked out
  - Upper barrier(access to busbar) or lower barrier(access to cable) can each be unscrewed independently of the other

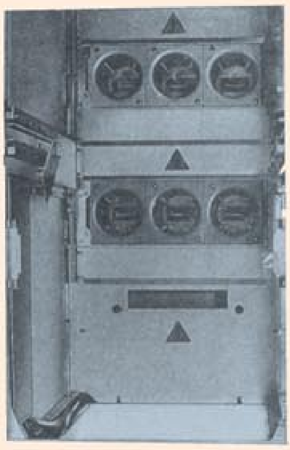
Partitions

These segregate neighbourig panels from one another

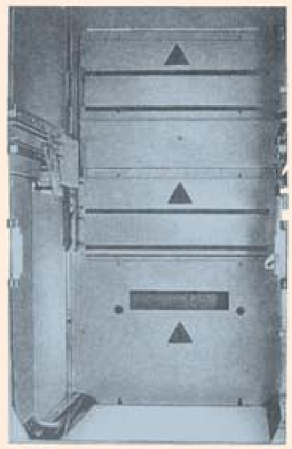
- Construction
  - Galvanized steel sheet
  - With cutout for continuous busbars
  - Optional bushing plate with cast-resin busings as end barrier for the busbars
  - Degree of protection to neighbouring panels:IP4X/IP40



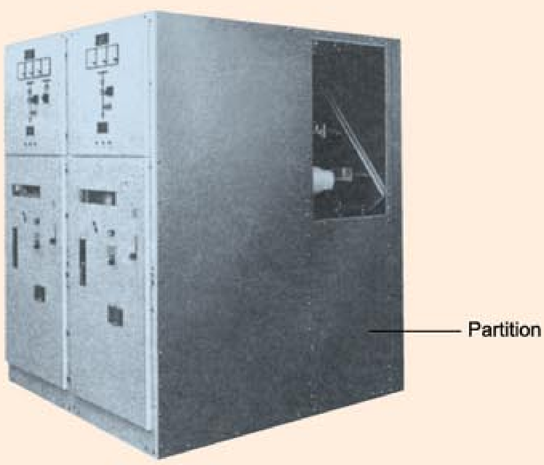
Panel with partition removed



Withdrawable section compartment metal shutters opened



Withdrawable section compartment metal shutters closed



Panel with partition

机械设计部分 Mechanical Design

压力释放

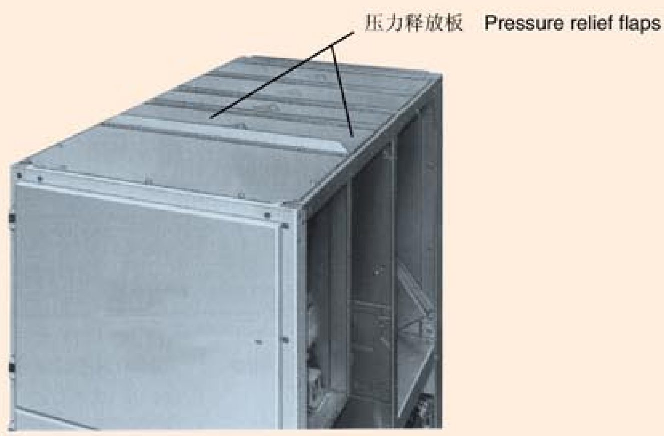
任何因柜内电弧故障产生的过高压力均由压力释放板排出。

- 结构
- 镀锌钢板
- 不能从外面打开
- 母线室，高压室和电缆室都有各自的压力释放板

Pressure relief

Any overpressure inside the panel resulting from fault arcing is released by the pressure relief flaps.

- Construction
- Galvanized steel sheet
- Cannot be opened from outside
- Separate pressure relief flaps for busbar compartment,withdrawable section compartment and connection compartment



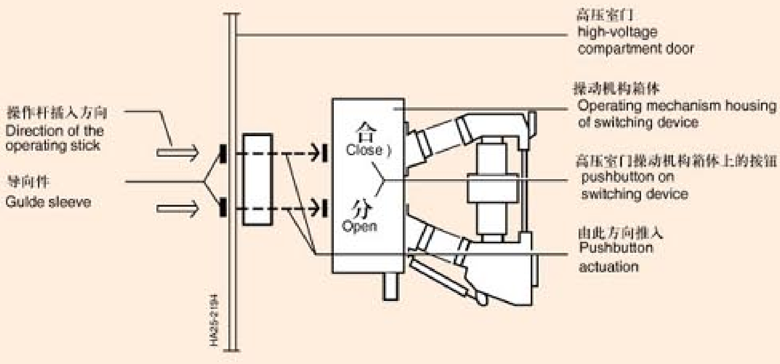
压力释放板
Panels with pressure relief flaps

高压室门

- 观察窗
- 抗压力
- 用于检查可移开部分的位置
- 用于检查断路器的合/分指示器，操作次数计数器和"弹簧储能"指示器
- 当可移开部分处于工作位置/试验位置，且高压门关闭时，旋转旋钮至露孔，插入操作杆进行分合闸操作.
- 锁
用钥匙（当符合联锁条件时）将高压室门锁住或打开
- 曲柄插入盖板
- 曲柄用于使机构中的弹簧储能
- 活门、可自行关闭
- 门把手
- 开锁以后，提起门把手，门即可打开。将之按下，门即关上（必须符合联锁条件）
- 打开挡住插入孔的挡板，以便操动可移开部分
- 曲柄用来推进或退出可移开部分（当联锁条件满足时）

High-voltage compartment door

- Inspection windows
- Pressure resistant
- For checking the position of the withdrawable section
- For checking the CLOSE/OPEN indicator of the switching device,the operations counter and the "closing spring charged" indicator
- lock
- For locking and unlocking the high-voltage compartment door by interlock key (complying with interlocking conditions)
- Access shutter for hand crank
- Hand crank for charging the operating mechanism springs of the switching device
- Access shutter closes automatically
- Door handle
- Lifting this handle,after releasing the lock,opens the door,lowering the handle closes the door (complying with inerlocking conditions).
- CLOSED/OPEN pushbuttons for switching device
- CLOSED/OPEN switching with withdrawable section in working/ testing position:with HV door closed, turn the locking plate aside to espose the opening and in sert the operationStick to push the button.
- Lever for unfolding the extension mechanism(see opposite diagram)
- Access shutter/Opening for operation of the withdrawable section
- For the crank handle for moving the withdrawable section(complying with interlocking conditions)
- For the interlock key of the withdrawable section (same key as for the high-voltage compartment door).

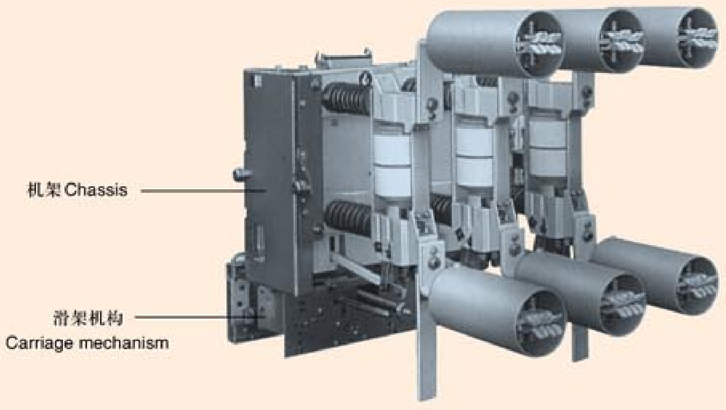


用于操作（合、分）柜内真空断路器的延伸杆
Folding extension mechanism for push button actuation, e.g. panel with vaccum circuit-breaker

Mechanical Design 机械设计部分

可移开部分
可移开式真空断路器
(有关技术数据请参阅第7页)
- 安装有3AH 真空断路器及弹簧储能操作机构

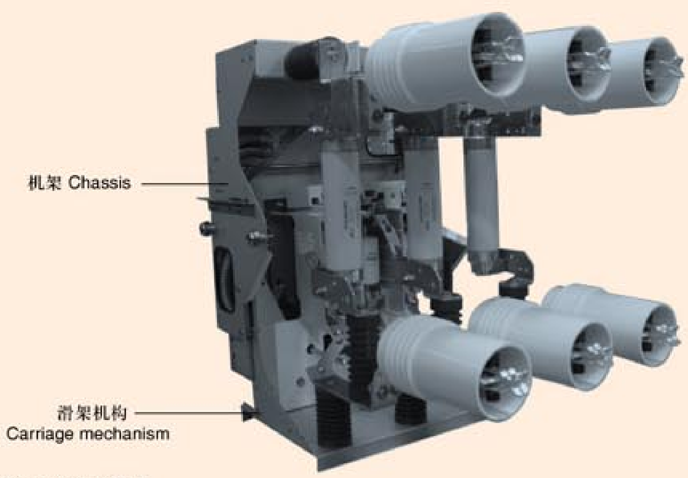
Withdrawable sections
Withdarwable vacuum circuit-breaker section
(For technical data see page 7)
- Fitted with 3AH vacuum circuit-breakers, with spring stored-energy operating mechanism.



可移开式真空断路器部分
Withdrawable vacuum circuit-breaker section

可移开式真空接触器
(有关技术数据请参阅第 6页)
- 装有电磁操作机构的 3TL6 型真空接触器
- 有高压限流熔断器每相最多装并联的两根
- 也可选用机械锁扣结构,以节约保持合闸状态所需电能

Withdrawable vacuum contactor section
(For technical data see page 6)
- Fitted with 3TL6 vacuum contactor with solenoid operating mechanism
- With HV HRC fuses optionally 2x parallel per phase
- Also optionally with mechanical ON-latching of vacuum contactor to reduce holding power



可移开式真空接触器
Withdrawable contactor section

机械设计部分 Mechanical Design

可移开部分

可移开式隔离排连接部分

(有关技术数据参阅第5页)

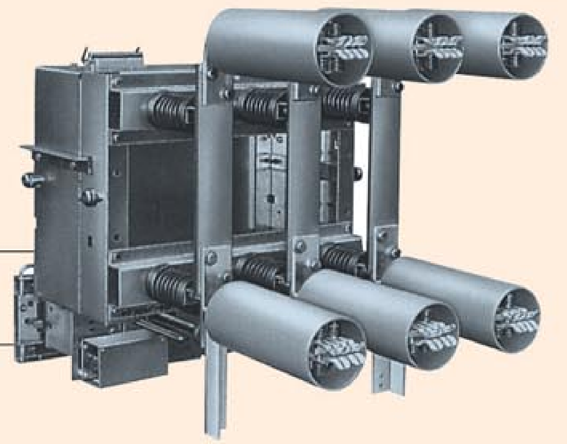
- 作隔离开关用
- 装有铜连接排
- 联锁用挂锁

Withdrawable sections

Withdrawable disconnector-link section

(For technical data see page 5)

- Performs disconnector function
- Fitted with copper links
- Padlock for interlocking



可移开式隔离排连接部分
Withdrawable disconnector-link section

可移开式测量部分

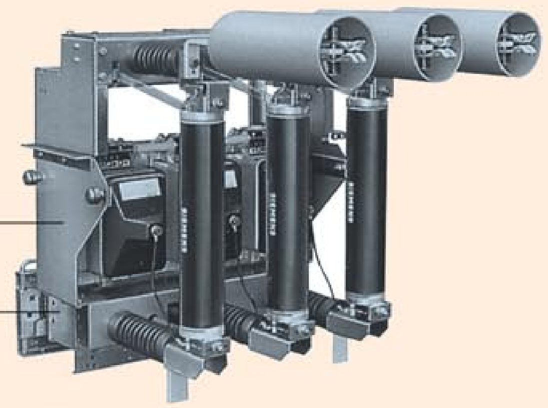
(有关技术数据参阅第6页)

- 装有环氧树脂浇铸的电压互感器最多可安装3台单极或2台双极的互感器
- 可选择在互感器初级安装熔断器
- 也可选择安装3台避雷器

Withdrawable metering section

(For technical data see page 6)

- Fitted with voltage transformers, cast-resin insulated, max. 3x single-pole or 2 x two-pole
- Optionally with primary side fuses.
- Also optionally with 3 x surge arresters.



可移开式测量部分
Withdrawable metering section

机架:

- 作为开关装置的支撑构架
- 侧板上装有轴承滚轮，可在柜内导轨上移动
- 导轨

滑架机构

- 装在操动机构箱体的下面
- 有驱动机构，用以推进，拉出可移开部分
- 也可选用电动机驱动方式
- 内部有联锁杆，用以探寻在工作位置或断开位置时，断路器的合/分状态
- 有联锁杆，用以探寻高压门和接地开关的位置状态
- 也可用辅助开关，当可移开部分处于不同位置时，它可给出相应的信号
- 可选用电磁联锁装置，控制可移开部分

Chassis

- For supporting the switching divice
- Side plates with ball-bearing rollers which run in the rails of the panel frame
- Guide rails.

Carriage mechanism

- Mounted underneath the operating mechanism of the switching device
- With drive spindle for moving the withdrawable section
- With optional drive motor
- With interlock rod to interrogate the CLOSED/OPEN position of the switching device in connected or disconnected position, respectively.
- Interlock rods for interrogating high-voltage compartment door and position of earthing switch
- Optional auxillary switch for withdrawable section position signaling
- Optional electromagnetic interlocking of withdrawable section.

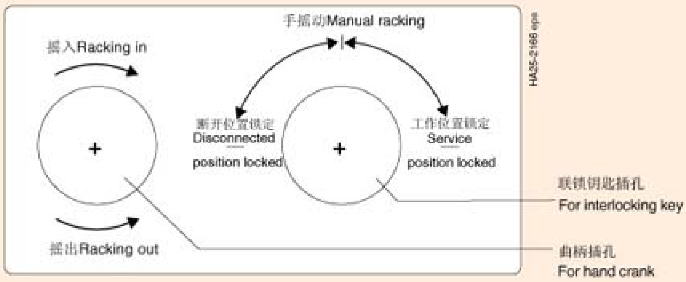
Mechanical Design 机械设计部分

可移开部分
手动操动机构

- 将联锁钥匙旋向“手摇动”位置
- 这样就打开了曲柄插孔的挡板，即插入曲柄，将可移开部分推进或退出。

Withdrawable section
Manual operating mechanism

- Turn interlock key to "manual racking" position
- This opens the access shutter for the hand crank; the withdrawable section can be racked in or out.



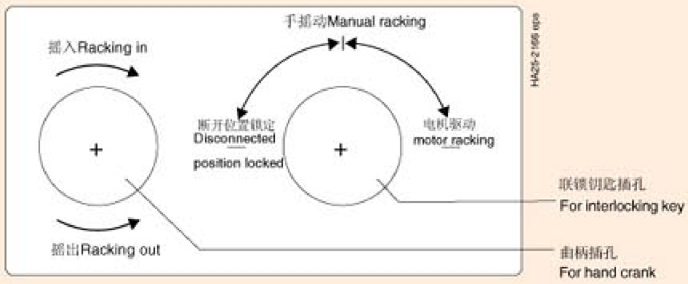
手动操作机构挡板的开启
Access shutter/Opening for manual operating mechanism

电动机操动机构

- 将联锁钥匙旋向“电动机驱动”位置
- 在柜前或遥控，进行推进或退出可移开部分的操作
- 手摇曲柄时，将联锁钥匙旋至“手摇动”位置
- 这样就打开了曲柄插孔的挡板，然后就可将可移开部分推进或退出。

Motor operating mechanism

- Turn interlock key to "motor racking" position
- Racking of withdrawable section either locally or remotely.
- For manual,turn interlock key to "manual racking" position
- This opens the access shutter for the hand crank; the withdrawable section can be racked in or out.



电动机操作机构挡板的开启
Access shutter/Opening for motor operating mechanism

触头

- 镀银扁铜排触头
- 触指的回弹性好(±10mm)
- 可互换

当更换触头时，请注意：

– 触头的额定值，可移开部分的630A触头与1250A触头完全可互换，当用其它额定值的触头来更换时，在结构上不能相配，从而避免了随意更换的误操作。

1)“断开位置锁定”不能用于接地开关的电动机驱动机构

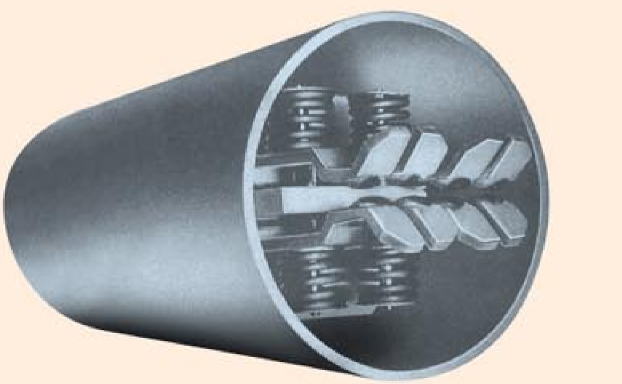
Isolating contacts

- Flat copper contacts,silver-plated
- Resilient mounting(tolerance±10mm)
- Interchangeable

Note the following when changing contacts:

– Contact rating
  630 A withdrawable sections are fully interchangeable with 1250 A withdrawable sections.
  With other current ratings. interchanging is prevented mechanically.

1) "Disconnected position locked" not applicable for motor operating mechanism of earthing switch



触头
Isolating contacts

低压室及接线

低压室

- 用以安装保护控制装置，测量元件和仪表
- 用具有防震动抗压的隔板使其与高压室隔开
- 可选择在门上装有观察窗
- 内部可利用的空间尺寸见第 8 页

低压接线

- 可移开部分控制电路是通过64芯插头与金属软管内的软导线连接起来的。
- 开关柜的控制回路使用软导线连接并穿入柜内金属软管中
- 电压互感器次级回路使用软质多芯线

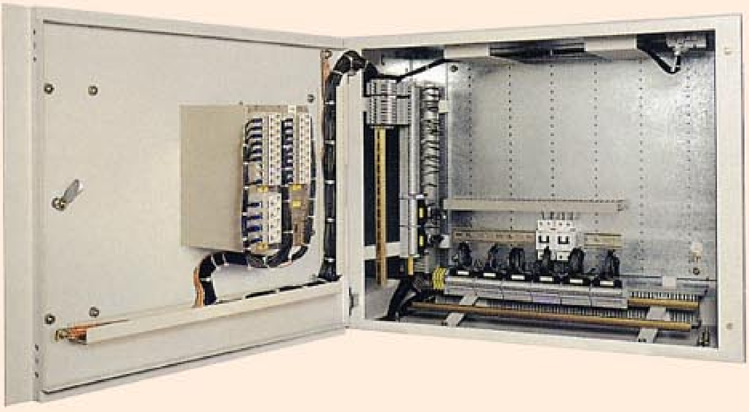
Low-voltage compartment and wiring

low-voltage compartment

- For accommodating the devices for protection,control,measurement and metering
- Shock-proof and pressure-resistant partitioning from the high-voltage compartment
- Door optionally with inspection window
- For usable fitting dimensions see page 8

Low-voltage wiring

- Withdrawable section control circuit wires via 64-pole plug connector,flexible wires in a metal conduit
- Panel control circuits with flexible wires, metal-enclosed
- Flexible multi-core wires for instrument transformer secondary circuits.



内部装有设备的低压室
Low-voltage compartment with built-in equipment

标 准 Standards

标准、技术条件及导则

标准与技术条件

8BK20型户内开关装置符合下述标准与技术条件
- IEC出版物298 以及附录AA 和IEC出版物694
- DIN,VDE 0670,第6 部分 601 和1000
- PEHAL 导则No.4
- ANSI C37,20c,1974(主要要求)
- NBN 610
- BS 5227
- SEN 36 2103
- N.E.N. 10298

载流能力
- 按照DIN，VDE 0670 第部6 分和1000部分、以及IEC 298 或694，载流能力与下列环境温度有关
- 24小时平均最高温度 +35℃
- 最高温度 +40℃
- 开关柜和母排的载流能力取决于柜外环境温度
- 在封闭的开关柜内，载流能力因通风的限制而有所下降，采用下列措施后可以将之提高
- 使用更大容量的断路器
- 自然通风，即在高压室门和柜顶盖板上开设有防护纱网的通风槽
- 强制通风，即在高压室门上开设有防护纱网的通风槽，在柜的顶部安装风扇

按EEC会员国达成一致的协议认为，这些国家标准符合IEC 298号出版物

绝缘强度
- 经试验验证，开关装置和工频耐受电压和冲击耐受电压符合DIN，VDE 0670，第1000部分和IEC694 号出版物，为了适合中国电力系统的要求，将工频耐受电压提高到中国标准DL404的要求，这些数值在表中用* 标出
- 表中的额定值对应的条件是：
  海平面和正常的气候条件(1013hpa,20℃,11g/m³湿度，符合 DIN，VDE O111和IEC71号出版物规定的标准状态)
- 如果空气随着海拔的升高而减少，绝缘强度可以通过用于海拔1000m 以上高度的修正因数来计算。

Standards, specifications, guidelines

Standards and specifications

Type 8BK20 switchgear for indoor installation complies with the following current standards and specifications:
- IEC Publication 298 with appendix AA and IEC Publications 694
- DIN VDE 0670, Parts 6,60 and 1000
- PEHLA Guideline No.4
- ANSI C37.20c 1974

(principal requirements)
- NBN 610
- NF C64 400
- BS 5227
- SEN 36 2103
- N.E.N. 10298

In accordance with the harmonization agreement reached by the EEC countries, their national standards conform to IEC Publication 298.

Current-carrying capacity

- According to DIN VDE 0670, Part 6 and 1000 and IEC 298 or 694, current carrying capacities are referred to the following ambient temperature:
- Maximum of 24 hour mean +35℃
- Maximum +40℃
- The current-carrying capacity if the swichgear panels and busbars depends on the ambient temperature outside the enclosure
- In the enclosed switchgear panels, the current-carrying capacity can be partly reduced by the restricted ventilation. It can be increased by:
- Using a circuit-breaker with a high rated current
- Through-ventilation, i.e prod-proof ventilation. slits in the high-voltage compartment door and in the top cover plate
- Forced ventilation, i.e. prod-proof ventilation slits in the high-voltage compartment door in conjuction with a fan on the top cover plate.
- **Insulating capacity**
  The insulating capacity is verified by testing the switchgear and the rated values of power-frequency withstand voltage and impulse withstand voltage acccording to DIN VDE 0670. Part 1000 and IEC Publication 694
- In order to meet the requirement of Chinese power system, values of power frequency withstand voltage has been increased to the ratings in DL404. These values are marked with * in the table
- Rated values are referred to sea level and to normal atmospheric conditions (to 13h Pa, 20℃ 11g/m³ humidity in accordance with DIN VDE 0111 and IEC Publication 71).
- The insulating capacity if air decreases with increasing altitude, and can be calculated by using a correction factor for sites higher than 1000m above sea level.

额定电压(有效值) Rated voltage(rms)	工频耐受电压 (有效值) Rated power-frequency withstand voltage(rms)		冲击耐受电压 (峰值) Rated impulse withstand voltage(rms) (peak)	
	断口 for isolating distances kV	相间及对地 between phases and to earth kV	断口 for isoating distances kV	相间及对地 between phases and to earth kV
7.2kV List 2	23 32*	20 32*	70	60
12kV List 2	23 48*	28 42*	85	75

标准，技术条件与导则
Standards,specifications, guideline

防止异物侵入开关柜
Protection against ingress of solid foreign bodies

防护等级规定如下：
根据DIN VDE 0670 第6部分，IEC标准298或DIN VDE 0470第1部分及IEC标准529
Protection against electric shock and ingress of solid foreign bodies
• The degree of protection to DIN VDE 0670, Part 1 and IEC Publication 529 are as follows

标准/技术指标 Standard/ specification	编号 No.	防护等级 Degree of protection
DIN VDE,第 6 部分 IEC 标准 298 DIN VDE 0670,Part 6, IEC Publ, 298	IP4X	防止厚度大于1mm的线状或带状物伸入柜内接近带电体和可移开部分，对防水无要求。 Protection against to live parts and contact with internal moving parts by wires or strips of thickness greater than 1 mm, No specification regarding protection against water.
DIN VDE,第 6 部分 IEC 标准 298 DIN VDE 0670,Part 6, IEC Publ, 298	IP40	防止厚度大于1mm的线状或带状物伸入柜内接近带电体和可移开部分，对渗水无防护要求。 Protection against to live parts and contact with internal moving parts by wires or strips of thickness greater than 1 mm, No against protection penetrating water.
	IP41	防止厚度大于1mm的线状或带状物伸入柜内接近带电体和可移开部分，可防止垂直方向的滴水。 Protection against to live parts and contact with internal moving parts by wires or strips of thickness greater than 1 mm, protection against vertically dripping water.
	IP50	防止有害灰尘沉积；不防渗水。 Protection against harmful dust deposits. No protection against penetrating water.
	IP51	防止有害灰尘沉积；防止渗水。 Protection against harmful dust deposits. Protection against penetrating water.

• 8BK20 开关柜的防护等级： • Degrees of protection for type 8BK20 switchgear.

开关柜 Panel	无通风槽开关柜的防护等级 Degree of protection panel without ventilation slits 标准型 standard	可选型 optional	有通风槽开关柜的防护等级 Degree of protection panel withproof ventilation slits 标准型 standard	可选型 optional
高压室门关闭时 with HV compartment door closed	IP4X IP40	IP41 IP50 IP51	IP4X IP40	IP41
高压室门开启时 with HV compartment door opened	IP4X IP40	—	IP4X IP40	—

• 8BK20 开关装置的防护等级： • Degrees of protection for type 8BK20 switchgear.

不设通风槽时 Degree of protection panel without ventilation slits 标准型 standard	可选型 optional	设有带纱网的通风槽时 Degree of protection panel with prod-proof ventilation slits 标准型 standard	可选型 optional
IP4X IP40	IP41 IP50 IP51	IP4X IP40	IP41

标 准 Standards

内部电弧故障的防护

- 在进行证实开关柜的防护内部电弧故障能力的试验中，应对操作人员加以适当的安全保护。
- 关于防护内部电弧故障能力的试验，可由操作人员与制造厂家按DIN VDE 0670, 第6部分和IEC298号出版物来进行。
- 试验必须按照DIN VDE 0670, 第601, PEHLA导则 No. 4 以及IEC 298号出版物和附件AA进行。
- 8BK20型开关装置能够达到上述标准和技术条件，并说明如下：
- 标准 1 至 3 和 6 是标准方案
- 标准 1 至 6 需带有附加措施才能达到
- 各标准的定义如下
- 标准 1, 门和盖板安全可靠，在工作中不可打开
- 标准 2, 可能造成危险的部件不会飞离
- 标准 3, 在柜体的外部可以接触的部位，不应出现孔洞
- 标准 4, 垂直布置的指示器未引燃
- 标准 5, 水平布置的指示器未引燃
- 标准 6, 接地连接始终可靠
- 对内部电弧故障的防护
- 可以符合或超过上述标准和技术条件的要求
- 这时，内部电弧的影响被限制在柜内
- 对相邻的开关柜不会因压力增大而产生影响，能防止在可移开部分产生的压力分别对电缆室和母线室的影响（仅对最大额定电流至 2500A的馈电柜而言），能防止在母线室产生的压力分别对可移开部分和电缆室的影响（仅对最大额定电流至 2500A的馈电柜而言）
- 压力开关(可选择的保护元件)
- 可将电弧故障的持续时间限制在100ms
- 使电弧故障造成的损害减至最小
- 建议试验时保护时间>0.5s
- 压力开关的功能试验可在不切断电源时进行
- 压力开关动作，使进线断路器脱扣

Resistance to internal arc faults

- Tests for verifying resistance to internal arc faults should establish proper protection for operating personnel.
- Tests for resistance to internal arc faults can be agreed between operator and manufacturer according to DIN VDE 0670, Part 6 and IEC Publicaton 298
- The tests must be performed in accordance with DIN VDE 0670, part, 601, PEHLA Guideline No.4 and IEC Publication 298, Appendix AA.
- Type 8BK20 switchgear conforms to the criteria
  of the above standards and specification
- Criteria 1 to 3 and 6 in the standard version
- Criteria 1 to 6 with additional measures
- The definitions of the criteria are as follows.
- Criterion 1
  Correctly secured doors, covers do not open.
- Criterion 2
  Parts which may cause a hazard do not fly off.
- Criterion 3
  No holes in the freely accessible external parts of the enclosure.
- Criterion 4
  Vertically arranged indicators do not ignite
- Criterion 5
  Horizontally arranged indicators do not ignite.
- Criterion 6
  Earthing connections are still effective
- Resistance to intenal arc faults
- Can be provided over and above the requirements of the above-mentioned standard and specifications.
- In this case the effects of an internal arc are then confined:
  pressure-proof to the neighbouring panels.
  pressure-proof from withdrawable section compartment respectively connection compartment to the busbar compartment
  (only for rated current of feeders up to 2500A)
  pressure-proof from busbar compartment to withdrawable section compartment respectively connection compartment
  (only for rated current of feeders up to 2500A)
- Pressure switches (optionally)
- Limit the duration of arcing to a maximum of 100ms
- Minimize the damage caused by arcing
- Recommended grading>0.5s
- Functional test of pressure switch possible without interruption in service
- The pressure switch trips the incoming circuit-breaker.

标准，技术条件与导则
可移开部分的几种位置

如DIN，VDE 0670，第6部分和IEC 298号出版物所述，8BK20型开关装置的可移开部分有三个不同位置：

- 工作位置
- 在此位置，开关装置将母线与开关柜接线连接在一起
- 低压插头插进插座
- 断开位置
- 可移开部分处于断开位置时，可以确保不会产生由母排到这部分发生电弧闪络
- 低压插头可以插入也可拔出插座
- 试验位置
- 低压插头插入插座

Standards, specifications, guidelines
Withdrawable section positions

There are three different positions for withdrawable sections of type 8BK20 switchgear as defined in DIN VDE 0670. Part 6 and IEC Publication 298:

- Service position
  In this position, the switching device establishes a connection between the busbars and the panelconnection.
  The low-voltage connector is plugged in.
- Disconnected position
- The disconnected position is assured.i.e.
- flashovers are only possible to earth.
  The low-voltage connector can be plugged in
- or out.
  Test position
- The low-voltage connector is plugged in.
-

联锁

- 下述联锁功能是根据DIN, VDE0670，第6部分和IEC298出自版物定义的。
- 断路器或接触器如果不是处于分闸状态，将它们从工作位置退出或将之从断开位置推入工作位置都是不可能的。
- 如果不是在工作位置，而是在移动过程中，企图使断路器，负荷开关或接触器合、分操作是不可能的
- 准备增加或改变联锁装置，必须经制造厂与用户达成协议，制造厂应提供所有必要的有关联锁装置特点和功能的资料
- 对那些如果不正确地操作会将之损坏的装于主回路中的电器以及为在维护中提供绝缘距离的电器，应该使用联锁装置将之加以保护 (例如挂锁)，只要实际上可能的话，应使用机械联锁
- 8BK20型开关装置完全达到并超过上述的联锁条件

为了避免可能发生的误操作，8BK20采用匙钥控制的机械联锁机构以保证人员安全和操作无误。下列操作仅当相应的联锁条件满足后才可进行。

Interlocks

- The following interlocks are specified by DIN VDE 0670, part 6 and IEC Publication 298:
- The withdrawable or engagement of a circuit-breaker, switch or contactor shall be impossible unless it is in the open position.
- The operation of a circuit-breaker, switch or contactor shall be impossible unless it is in the service or disconnected position.
- The provision of additional or alternative interlocks shall be subject to agreement between manufacturer and user. The manufacturer shall give all necessary information on the character and function of interlocks.
- Apparatus installed in main circuits, the incorrect operation of which can cause damage or which are used for assuring isolating distances during maintenance work.shall be provided with locking facilities (for example, provision for padlocks).Whenever practical, preference should be given to mechanical interlocks.
- Type 8BK20 switchgear fulfills other interlocking conditions over and above those mentioned here.

To avoid any possible mal-operations, a key-controlled interlocking mechanism is adopted to ensure operators' security and normal operations. The following operations can be carried out only when the relative interlocking conditions are satisfied.

可移开部分

- 可移开部分由断开位置至工作位置：
- 低压插头插入
- 高压室门关闭
- 断路器分闸
- 接地开关断开
- 操作断路器：
- 可移开部分在工作或断开位置并被锁定
- 操作接地开关：
- 可移开部分在断开位置并被锁定

Withdrawable part

- Withdrawable part moving from disconnected position to service position:
- Low voltage plug inserted
- Door of high voltage compartment closed
- VCB switched off
- Earthing switch switched off
- Operation of VCB:
- Withdrawable part locked at either service position or disconnected position
- Operation of earthing switch
- withdrawable part locked at disconnected position

门

- 高压室门只可能在下列情况时才能打开：
- 可移开部分被锁定在断开位置
- 自动活门遮盖住静触头和触头罩，此时防护等级为IP4X

Door

- The door of the high voltage compartment can only open under following situations:
- Withdrawable part locked at disconnected position
- Fixed contact and insulator covered by metal shutter automatically with protection level IP4X

低压室

- 低压室位于开关柜的上部并有自己的室门。
- 低压室和高压室之间的隔板具有抵抗电弧故障的能力。
- 控制和计量电缆与可移开部分用64芯插头连接。
- 每个低压室的侧板上设有二次电缆的通道。
- 低压装置，计量及保护设备可安装在门上或室内的安装板上。
- 柜内的二次接线为白色绝缘多股绞线，其中电流回路用截面2.5mm²的导线，电压回路用截面1.5mm²的导线。

Low voltage compartment

- Low voltage compartment locates on top of the panel with its own door.
- The partition between LV compartment and HV compartment is of arc-proof.
- Control and measuring cable connect withdrawable part via a 64-pole plug.
- A secondary cable duct is set on the sidewall of each LV compartment.
- LV devices, measuring and protective device can be installed on the door or board inside.
- White multi-core wringed wires are used for the secondary circuit inside panel, 2.5mm² for current circuit and 1.5mm² for voltage circuit.

标 准 Standards

标准，技术条件与导则
气候与环境条件

如果需要，并增加辅助设备，8BK20开关装置可以用于下列的类型和环境温度。

- 气候类型11，12，13
  该气候类型是根据IEC72-3-3号出版物和西门子标准SN29070第一部分定义的。
- 气候类型11
  建筑物的房间有着良好的隔热能力或其热容量高 (对冷、热均如此)，通常只对温度进行控制如通常的起居室、办公室、商店、电话总机室或精密产品储藏室。
- 气候类型12
  建筑物的房间有着良好的隔热能力或热容量较高，对室内温度未加控制，只有偶然加热或降温几天的场所，无人看管的继电器室、增压站、变压器站、马厩、机动车修理场、半成品车间、飞机库。
- 气候类型13
  建筑物房间没有专门的隔热材料，或其热容量很低，室内既无加热器也没有降温装置，例如：电话间、建筑的入口处、谷仓、无取暖设施的储藏室、棚、车库。
- 环境条件
- 自然污染
- 化学物质的污染
- 小动物

Standards, specifictions, guidelines
Climate and ambient conditions

Type 8BK20 switchgear, if necessary with additional measures, can be used in the following climate classes and under the following ambient conditions:

- **Climate classes 11, 12, 13**
  The climate classes are based on IEC Publication 72-3-3 and Siemens standard SN 29070 Part 1 and are defined as follows:
- **Climate class 11**
  Rooms in buildings with good thermal insulation or high thermal capacity heated or cooled; normally only the temperature is monitored,e.g.in nomal living rooms, offices, shops, telecommunication exchanges, storage rooms for sensitive products.
- **Climate class 12**
  Rooms in buildings with good thermal insulation or high thermal capacity heated or cooled, without temperature monitoring; heating or cooling subject to failure over several days, e.g. unattended relay, booster or transformer stations, stables, motor vehicle repair shops, manufacturing rooms for unfinished products, hangars.
- **Climate class 13**
  Rooms in buildings without significant thermal insulation and with low thermal capacity, neither heated or cooled, e.g. telephone booths, entrances of buildings, barns, lofts, unheated store rooms, sheds, garages.
- Ambient conditions
- Natural pollutants
- Chemically active pollutions
- Small animals.

影响开关装置的室内气候 Room climate[1] affecting the switchgear	环境温度 Ambient temper-ature	相对湿度 Relative humid-ity	凝露 Condensation	特殊的环境条件 Special ambient conditions	所需辅助措施 Additional measures needed
气候类型 11 Climate class 11	+5- +40℃	5- 85%	无 none	无 none	
气候类型 12 Climate class 12	+25- +55℃	10- 100% 2小时 for two hours	偶然一月 2小时	无 none	有 yes
				沙尘 blown sand	有 yes
			灰尘 dust	有 yes	
				小动物 small animals	有 yes
气候类型 13 Climate class 13	+25- +70℃	10- 100%	经常一天 2 小时	无 none	有 yes
				沙尘 blown sand	有 yes
		经常 frequently	灰尘 dust	有 yes	
			once a day	小动物 small animals	有 yes
			for two hours	天花板滴水 (无害) 按照 DIN 40050IEC529 Dripping water DIN 40050 and IEC publ.529	有 yes

有化学污染的地区 Areas subject to chemical pollution		二氧化硫 Sulphur dioxide(SO_2) ≥ 2ppm	有 yes
		硫化氢 Hydrogen sulphide(H_2S) ≥ 1ppm	有 yes
		盐酸 Hydrochloric acid(HCL) ≥ 3ppm	有 yes
		氨气 Ammonia(NH_3) ≥ 15ppm	有 yes
		二氧化氮 沉积的氯化物 (盐雾) ≥ 2mg/dm³ Chioride deposit (Cl^-) (Saline fog) ≥ 2mg/dm³	有 yes
		沉积的氯化物	有 yes

1) 根据 IEC 72-3-3 号出版物和西门子标准 29070 第一部分
1) Based on IEC Pubilication 72-3-3 and Siemens standard SN 29070 Part 1.

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